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The Illustrated

JOURNAL OF AGRICULTURE

THE ILLUSTRATED JOURNAL OF AGRICULTURE is the official organ of the Council of agriculture of the Province of Quebec. It is issued Monthly and is designed to include not only in name, but in fact, anything concerned with agriculture, as Stock-Raising Horticulture, &c., &c.

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THE ILLUSTRATED

Journal of Agriculture.

Montreal, April 1, 1897.

The Farm.

NOTE.—The "Journal of Agriculture" will, for the future, contain twenty pages of reading matter instead of sixteen. The Editor would feel obliged to contributors if they would send in their communications by the 15th of the month preceding publication.

FARM-WORK FOR APRIL.

Preparation of land—Seed and sowing—Live-Stock.

Many men, many opinions; but every man who does us the honour to read these notes will agree in this; that the first sign of spring is a most welcome sight, after the eye has become weary of the dead monotony of the snow, and the ear is listening eagerly for the first sounds of the birds, whether they come from the crow, the song-sparrow (le rossignol) or the robin (thrush.) (1)

Towards the end of this month we may fairly anticipate that the earth will have become visible once more, and the season of seed-time be at hand. Let every farmer, then, take care that he is ready to do his part; that his horses are fit for their arduous labours; that his ploughs, harrows, and other implements are in good trim; for it is a comparatively easy task to keep up work, but to overtake neglected work is a bother, and those who neglected keeping the plough at work during the long open season of last autumn will have plenty of cause, but little time, for repentance this spring.

For, supposing, for instance, a man works a farm of 100 arpents in a 7 years rotation; 1 year in hoed-crops, 1 year in grain after grass, 1 year in grain after hoed-crops, and four years in meadow and pasture; it is clear he will have 43½ arpents to plough every year, and the horses and man must step along pretty briskly, the weather must be propitious, and no delays must occur, if that number of arpents can be got over in fewer than 30 working days, and if this be put off till the spring, no wonder that, in our heavy lands, we see men sowing oats as late as the 10th June! We know well that, in some seasons, when the iron hand of the frost is laid upon the land, at it sometimes is by the middle of November, and stands to its work uninterruptedly for the following five months; in such a case, we know well that fall-ploughing cannot be carried out to its most desirable extent. But this year, such has not been the case. There was plenty of time to do the work, and although the constant rain did at one time make it look as if the plough would have to remain idle in the furrow, still, the desired change did come, and the latter end of the season was better than the former.

(1) The "rossignol" of Europe is a very different bird.—Ed.

And it is owing in great part to the neglect of fall-preparation that so much bad, shallow, wide-furrow ploughing is done in the spring; for, if the season for incessant labour arrives and finds you unprepared to go along with it, every creature, horses, men, and women, will be made to toil every day beyond endurance, not to keep up work, which is, as we said before, an easy, pleasant lightsome task, but to make up work, which is a toilsome burden. Time was lost when you were idling it away in a season you considered of but little value; and even if you do overtake your work at last, it will be, in great part, toil bestowed in vain, as your seed will not be got into the ground in its proper season, and the yield will inevitably be inferior in both quantity and quality.

SEEDING.—If you happen to be late in sowing grain, you must remember that, though a moderate quantity of seed to the arpent may suffice in the early part of the season, the later the sowing the more seed must be sown, on account of the late sown seed not having time to tiller. If 3 bushels are sufficient for early sowing, say April 20th, 4 bushels will be none too much in the last week in May.

Again, as to the condition of the land and the quantity of seed; ask yourselves this question: is a plant likely to throw out more shoots and to bring them to perfection on a well manured, well harrowed field, or on a field badly worked and badly manured? The answer is so clear that it need not be stated; therefore, the poorer the land and the worse cultivated it is, the more seed should be sown.

PEASE.—If you have a drill, put your pease in with it at least 3 inches deep. Pease must be buried well, or else they grow fluffy, and spindle. Nine pecks of seed to the arpent will not be too much seed.

If any one would only try to sow them in rows, about 27 inches apart, and horse-hoe them every week until they "shake hands" across the rows, they would tell us news of the crop after harvest.

It is difficult to sow pease too early; if they are deeply sown, they will stand a very hard frost. We have known them laugh at 25o of frost.

WHEAT.—Seven pecks to the arpent sown with the drill, or let into the ground with the grubber, and well worked with the harrows both before and after sowing. Roll with a heavy roller when up.

Harrow both pease and wheat after they have got firmly rooted.

OATS.—Three bushels to the arpent *from 2nd April to 10th May. After that,* 3½ up to the end of May; and if you must sow in June, do not grudge another half-bushel.

BARLEY.—Two and a-half bushels an arpent to begin with, and 3 bushels later on. No use trying to grow a good sample of malting barley, unless the land is thoroughly well prepared. New-Zealanders not rarely grow 70 bushels of barley to the imperial acre: What is a good crop here? M. Séraphin Guevremont, at Sorel, grew, last year, 1896, 46 bushels of grain and pulse—oats, barley, and pease—to the arpent; equal to 35 bushels to the imperial acre (1) How many other farmers did as well?

(1) See his letter, p. 138, Jan. No., 1896.

COWS.—Plenty of milk by the end of April. *Autumn calving does not seem* to have become popular, which is a pity, as a lot of cows standing idle about the yards and houses is not a profitable look out for the farmer. A month yet to grass; do not turn out, if you can help it, before the pasture has got a fair bite upon it. The damage done to herbage by rip...ng off the first blade is unknown. A few pease mixed with the other grain, a fortnight or so after calving, will do your cows a marvellous amount of good, but do not try to force *them too soon.* We *have said so much* about the rearing of calves lately, that we need not go over the story again. Read Mr. Parry's article on milk, in this number, and attend to its advice.

SHEEP.—Keep the ewes that have lambed in moderate condition for the first week or two, unless they have been well done by all through the winter, in which case they may be put along pretty freely. People are too apt to half-starve pregnant ewes and cows, and then to feed them up after parturition; a mistake whence come fevers.

SWINE.—Young pigs all over the place now; slop the sows well with skim-milk, whey, and middlings; or, as *they are very cheap ground oats.* Do not wean too soon; no pigling ought to leave the sow till it is at least 6 weeks old.

HORSES.—Get your plough-teams into regular working order. Hard food and moderate work, with a cold bran-mash once a week, and no going out the following day; colds are often taken after the mash; it seems to open the pores of the skin, somehow or other, so, in our rather large stable in England, it was given always on Saturday nights, and the horses rested the Sundays. Our stables—hunters, carriages-horses, and farm-horses—were always marvellously free from disease, and, whether rightly or wrongly, it was always attributed *to this treatement.*

LIMING LAND. If you propose to lime any of your land, by no means plough it in; keep it as near the surface as possible. Spread it on land already ploughed, and harrow it in. This is the plan always pursued in Scotland, where they use more lime than would be believed here. We have known of as much as 500 bushels being applied to an acre, and, if it did not pay, we do not think the Scotch farmers would go to such an expense, as they are not people to throw their money away; As Stephens, in "The Book of the Farm," says: Never mind applying lime near manure. Of course, it would not do to mix it with guano, or *any ammoniacal fertiliser,* but it can do no harm if it is put on the land after dung has been ploughed in, or after a dunged potato-crop has been lifted, etc.

TOO EXPENSIVE.—Can land plaster at $8 per ton be used economically as an

absorbent in cow stables? R.F.P. "Boston, Mass." (We do not think it can. You could better afford to draw common earth, or better, sods or leaf mould, into the barn when the weather is dry in mid-summer, and store it for winter use, than to pay any such price for land plaster. Three or at most four dollars a ton is all you could afford to pay for it as an absorbent.)

"Country Gentleman."

This agrees with what we have always held, and Dr. Girdwood of McGill, supports us in our opinion.

PRACTICAL FARMING.

Dehorning Cattle—Green oats—Straw—Making Beef—Treatment of Cows—Sheep—Young Cattle—Turnips.

(By James Dickson)

DEHORNING CATTLE.—I shall perhaps be excused for again referring to this subject although dicussed in a late No. Since then, I have had a further experience, and are more convinced than ever that there is no risk, and that there is not so much pain as I formerly supposed. A few days ago, I had a pair of three years old steers, 15 two year olds and 10 yearlings dehorned in thirty two minutes. The three year olds were in their stalls the others were in two separate lots loose, and deducting the necessary time lost in driving them into a proper pen, the time occupied was less than a minute each. In twenty minutes afterwards, two of the yearlings were chewing their cud, and when driven into their stable, they all kicked up and ran. The next morning I found seven of the yearlings chewing their cud. The two year olds took their food properly, but they were not happy and the three year olds were discouraged for a couple of days. It is a week since, and now they jam amongst each other as though not afraid of hurting themselves or each other. Why there appears to be so little pain I cannot tell, but there are many things in agriculture which we do not understand, practical facts, which when known to be such, we are not slow to appreciate.

GREEN OATS.—I am much pleased that so many adopted my suggestion as to cutting green oats for fodder. But it has not been so successful with many as it might have been. They did not cut early enough. The object is, to cut as soon as the straw is dead (1) at the root. It is of course impossible then to extract further nourishment from the soil. At that time the straw is soft and juicy. The hull of the kernel is tender, and the whole is more digestible, and without waste. Farmers are conservative in their methods, but they will not go back to the system of ripening their grain, trashing, and grinding it, if they once feed the larger part of their grain in the green state. There is loss in paying for thrashing and grinding, and feeding the straw to stock. An animal can subsist on straw for a time, at the expense of the fat, etc., it laid up in summer, but there is no money in that kind of farming and the sooner such farms are provided with silos the better. For many years, not more than half of my grain has been thrashed, and during the last four years I have had only one day's work with a threshing machine. With two sticks and a string, we manage in cold weather to beat and shake out enough for the horses, and for my own seed. (I have a piece reaped for the fall work of the horses and cut the heads off).

FATTENING CATTLE.—With my system, I fitted for market twenty-three (23) cattle, two, and three years old (part) to weigh an average of 976 lbs., and sold five weeks ago, at 3¼c, $10.00 off the lot. They had two feeds of oats and one feed of hay each day, the turnips that were grown on an acre, and $16.00 worth of corn meal after the turnips were finished, the cattle remaining in their stalls continously. I think the result will bear favorable comparison with any other method, including that of silage.

TREATMENT OF COWS.—From the number of questions in Agricultural Journals, it would appear that some dairymen have more trouble in that way than has been my experience. And I have no doubt they take greater trouble than I do, but I have always been careful to use the "ounce of prevention," and after a long experience with a dairy, sometimes above the twenties, I have not had the troublesome experience of many with a smaller stock. I lost one cow from the effects of having twins, only once had I one that cast her calf and I never had a case of milk fever. It is not farming, to starve a cow until nature cannot properly fulil its functions. And if I came into possession of such, I would at once, carefully get some flesh on her bones, remembering that she will give me extra after she calves to pay for extra feed, besides the pleasure, and certainty of her doing well. It is not necessary that cows be fat, but it is necessary that they be in "good working order." Feed carefully. Don't hurry her. How seldom cows do badly, calved on the grass. Give her the next best substitute, green oats or hay. Yes, I said green, without giving a reason, all farmers know the difference. And if you adopted my suggestions last spring you have some turnips for her, 15 to 20 lbs. a day for a month before she calves will be well repaid. Better to have a poor cow gaining than a fat one weakening. The floor upon which she stands ought to be nearly level; bed her with dry horse manure and a little straw, and immediately after calving raise her high behind, until certain that the straining in past. I have had them raised two feet around behind higher that her front feet, and there is nothing so simple or better for the purpose than horse manure. After calving, before she cools, in some stables it will be necessary to blanket her. Give her a warm gruel drink a bran mash warm. No cold water until danger of trouble is past, and then not more than a pail at a time. Keep her warm. If she has shown a great flow of milk, her turnips must be stopped some time before calving, substitute oats, warmed just sufficient to make them soft, having previously been sprinkled with water; feed them so that they must be eaten slowly, (scatter them in the manger) sometimes a cow will eat oats treated in this way, when nothing else tempts her. In some countries Doctors are paid according to their ability to keep their patients well, and not according to their ability to cure. Cows always pay their Doctors on that principle.

SHEEP.—Considering the amount of investment, the labour and feed, there is nothing on the farm that pays better than sheep when properly cared for, And if the Government cold storage scheme is successfully applied, weekly supplies of Canadians lamb will be appreciated in Great Britain. It is not necessary that they should be fat, like those we see at Exhibitions. The usefulness of a sheep is past that does not keep in good heart on early cut, fine, green hay. But the lambs will be stronger making less trouble with both lambs and sheep, if they get even half a lb. of oats every day, and for a short time before to lamb, start the milk with turnips.

YOUNG CATTLE. If these have been fed on straw, it pays well in spring to feed a few oats. A friend of mine, 30 years ago, said oats are worth 50 cents a bushel to feed to early beef steers. At present prices it certainly pays. Those who have been feeding green oats during the winter will have a new experience in beef-making next summer.

TURNIPS.—If there are any weeds in the manure (when are there none?) you will use for them, they must be destroyed by rotting. Now is a good time to haul it out to make the "midden." Be careful that it does not get overheated, use snow or water to regulate with, do not turn it over. Stop the heating only in the centre of the heat, that it may continue to the outside. Experiments at Ottawa show that ton for ton, rotted manure produces no more than unrotted. Undoubtedly the reason is that the virtue of the manure is lost during the rotting process, and that exposure wastes manure.

(1) Or rather yellow. Ed.

SPRING-WORK FOR GRAIN-CROPS.

Wheat sowing—Harrowing—Press-roller—Pickling—Barley and oats.

The sowing of grain-crops in the spring is, in this part of the world, carried on, as a general rule, in too great a hurry. As far as observation goes, it is pretty much of a toss up whether two, three, or more strokes of the harrow are given before and after sowing; as for the sharpness of the harrow-tines, that is left too often to chance, and the use of the roller, as a finish, is far too seldom seen. If a couple of bushels of wheat, for instance, are needed to complete the seeding of a field, no care is taken to pickle it before using, and the consequence is, that the germs of disease invade the whole yield of the piece, an injury that a little forethought would have obviated.

It is too commonly supposed that the same preparation for sowing and the same style of harrowing, etc., suit all kinds of spring grain. This is not the case. Wheat requires a firm bed, barley land can be hardly made too fine. Oats are usually considered to be easily satisfied with any kind of treatment, but you may rest assured that even oats, "rugged" in constitution though they be, will pay for thorough work. Let us first consider the proper way to grow spring-wheat.

Wheat, we need hardly say, demands a certain amount of clay in the soil to which it is to be entrusted; in other words, it will not do well on sands, though in England, owing to the practice of feeding off root-crops with sheep, the firmness imparted to light land by their feet enables it to bear very decent crops of fall-wheat: spring-wheat is rarely seen in England, though, in Scotland, it is not uncommonly grown on soils too stiff for barley. Therefore, if you mean to grow spring-wheat, choose the stiffest part of your farm for that purpose.

We will suppose the field has been ploughed in the previous fall, and has previously borne a hoed-crop of some sort, potatoes or roots, say. Begin by pickling your seed, at the rate of two bushels an arpent or rather less—say 7 pecks—if the land is in really good condition, as it ought to be. Do remember that, as we remarked in another part of this number, spring-sown grain has no chance to tiller. Most of us known how to pickle seed-wheat: place a pailful of hot water on the heap of grain, and drop a few pieces of quick-lime into the water; when the ebullition has ceased, pour the mixture over the wheat and turn it over several times. If you like to sprinkle the seed with chamber-lye first, it will do no harm; but we have always found the former treatment act satisfactorily.

Of course, if you have a drill you will use it, but, in whatever way you sow, take care to bury the seed well. Sowing machines are so common now, that broadcast work by hand is seldom seen in the older districts. We do not approve of too much deep work with the grubler-teeth attached to the broadcast machines, as a firm bottom is the best for wheat; in fact, we prefer the drill and the repeated work of the harrow for this crop, and if we had no drill, we confess we should, if there was a fair interval between the crests of the furrows to hold the grain, rather sow on the stable autumn furrow undisturbed, even if in this way we lose the advantage of deep sowing. In England, our "wheel-presser", taking two furrows at a time, makes the finest bed possible for spring-wheat, and admits of the seed lying in a narrow bed three inches deep.

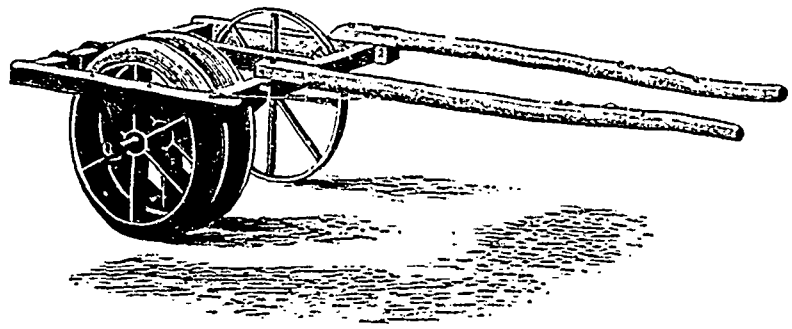
And now the seed is in the ground, don't be afraid of harrowing. Harrow, not three or more times, but until the "tread" of the land is equal all over, as you walk across the field. As we have often remarked, the harrowing is never perfectly executed until you can draw, with our foot, straight lines "across" the lie of the furrows as easily as if you were dealing with a bed of ashes. Treating the land thus, you will have finely pulverised three inches of soil for the seed to sprout in, and a solid, firm bed of soil to afford support to the roots. Then, when the "braid," or young plants are well up, roll, across the ridges, with the heaviest roller you can get, and if your crop is not a good one at threshing time, you will have the consolation of knowing that it is not the fault of the treatment you gave it in the spring.

Note:—Never omit a double stroke of the harrows across the ridges. No fear of pulling the seed up again should deter you from doing this; a few grains may appear on the surface, but plenty will remain below. Finish, of course, with one or two "tines" along; you will find that, after broadcast-work, six harrowings are none too many.

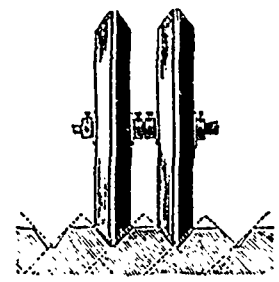
OATS.—The sowing of oats is to be conducted upon the same plan as the sowing of spring wheat, except as regards the quantity of seed to the acre. The quantity sown in Scotland would surprise many of our farmers. "The seeding of comon oats," says Stephens, "is usually 6 bushels to the acre (5 to the arpent), and in deep friable land, in good heart, 5 bushels of potato-oats." Well, these are rather large doses: we must content ourselves with 3½ to 4 bushels to the imperial acre, but as for

what is a common seeding here, 2 bushels to the arpent, it cannot give a crop. Our seasons are short; the hot sun soon sends the culms up, and there is little or no tillering. Try, if you are a thin sower, a good liberal seeding once in a way, and, our word for it, you will not repent it.

BARLEY :—The quality of this grain depends upon uniformity of growth. No barley sown on rough land, ploughed into rounded narrow ridges, can ever be fit for the maltster; the seed that falls on the "brows" of the ridges receive, but shallow covering; the seed that falls on the crowns gets deeper covering: therefore, the two cannot ripen together, and the maltster cannot make good malt out of unequally ripened barley. This grain does not require a firm bed, like



THE PRESSER-ROLLER.



wheat, what it needs, and must have if it is to be perfect, is a homogeneous bed, of the same degree of friability—forgive the two long words—from top to bottom of the furrow. If you have no drill, borrow one, and put in your 9 pecks of 6 rowel, or 10 pecks of the larger-grained 2 rowed barley with it, after having grubbed and harrowed the land to perfection. The rolling, after the grass-seed is sown, will make a fine surface for the mower to work upon.

GRASS LANDS.

Lawns — Rolling — Feeding — Liquid manure.

In Canada, and more especially in the Province of Quebec the grass lands are the most important portion of the farm, and yet the ordinary farmer seems not to pay the attention to them their great importance demands. Stock cannot be profitably kept without a good supply of grass in its various uses: permanent pasture, meadow hay and annual, rotational crop. Not only are our grass lands most valuable for stock, but contribute to the maintenance of the vital quality of the air we breathe! elaborating its grass, and making it wholesome. First, grass lands may be improved by the addition of more suitable herbage plants. We have hitherto been negligent in this particular, and have contented ourselves with sowing, timothy and clover, and trusting to luck for other grasses to grow spontaneously. Now, if we studied well the question as to what our grass land was intended to produce, or what purpose they were intended to serve, whether upland pasture, rotative crop, or meadow, we should have some idea as to the system we must adopt to attain our end. It would be perhaps difficult and expensive to make experiments as to which grasses to sow in the various places we might require them, but a great deal is being done now at the experimental farm in this direction, and, I would advise the readers of the Journal to keep a sharp look out as to what results are obtained from the different varieties under different circumstances of soil, situation and climate, and to base their operations on what they learn. The reports of the experimental farm are free to all who write for them (you need not even pay postage on your application for one provided it contains no other matter.) In my last article, as to grass being winter killed, I notice you ask Mr. Editor, why do not the lawns on Sherbrooke St., suffer from exposure and short clipping on the autumn? My idea is that the conditions are not the same as the open fields of the country. The grasses of which they are composed are of a more permanent and hardy quality, (1) they are close together, so that their roots are protected by the thick sod formed above them—then, continual clipping by the mower causes them to stool and ticken. (2) The gardens of the City are less exposed to the action of the intense cold than are those in the country, where the mind has a clean sweep sometimes for miles. Again, cutting it smoothly with the lawn mower is very different to grazing with cattle, the former presses the roots more firmly into the soil, and the latter tear up the roots of the less strong rooting kinds, and leave them exposed to the cold at a time when the roller would be of no use to press them into the firm position in the soil—so essential to their growth.

The roller is of course of great value, and should always be used as soon as it is possible to go on to the meadow in the spring, but the mischief, I apprehend, will have been caused to the lifted roots before this will be possible. My opinion, that, in this climate at least, keeping the stock off the meadows is the safest plan to ensure a good hay crop the succeeding year, is strengthened by observation. I saw meadows last year with only a small space between, and the land, a sandy loam, could not much vary. One had not had the aftergrass removed, either by cutting or grazing, the year previous, and the hay crop was a good average one, the other had been grazed down to the utmost limit and the crop was not worth gathering. (3) I was speaking to a farmer on this subject, in the western part of Brome County, and he told me that he had a meadow which he had mown twenty four years in succession and had never used any manure except its own aftergrass, and he could not see any diminution in the yield. I am therefore forced to the conclusion that under the condition of climate we have to encounter, this question of not grazing or grazing our meadows is one, from a strictly economic standpoint, of great importance. I wish some of your readers would give us the benefit of their opinion and experience. An old English writer says: "All grasses abhor a wet bottom and will not root in it deep enough to bear the changes of the climate, and not increasing by the roots as they ought to do, will die when they have perfected their seed, and leave the land bare." The meadows should be depastured but very slightly and heavily rolled in the early spring—"and further," grass lands if thus properly managed will maintain their fertility during an indefinite period without any costly appliance of manure." When the resources of a farm are incompetent to yield more than an ordinary amount of winter forage, extra enclosures should be planted to guard against any damage caused by severe frost or extreme and continued drought." By this means, every acre of a farm may be made profitable, and this is the true principle of comprehensive economy.

Of course all this applies to what we may call naturally rich grass land, but there is a good deal seeded down to grass which does not come with this category and will require manure at least occasionally. On such land too much care cannot be taken to have it in good condition before seeding down by the addition of lime, wood-ashes, or marl, if the land is tight and sandy, or peat muck if too retentive. Also by seeing that, before the seed is put in, the land has been thoroughly cleared of all obstructions to its growth, brush, stones, weeds, and all inequalities of surface. Top dressing with manure is most essential to success on thin poor soils. Liquid manure can be used with great advantage, the liquid manure cart is not popular enough with our graziers; a quantity of the very best manurial value is lost on every farm, and its application is quick and easy when you have the tools: a pump, and a barrel set on wheels behind which is a long box perforated with small auger holes. The first year's increase of crop on a few acres will pay for these. Some will say, "Oh we cannot afford all these appliances," and at same time will think that a handsome buggy is a necessity. There is no necessity to build an expensive liquid manure tank, a well, lined with clay, in the lowest corner of the yard will answer the purpose. But we ought to be continually on the look out how we can increase our stock of solid matter for top dressings There are, on every farm, continually accumulating, quantities of rubbish which might be made into good fertilizing material, and spare hours, when these could be drawn into a heap and rotted down, No time could be better employed than in laying up a stock of what will some day add to our income however small it may be. Pastoral farming is that suited to this part of Canada, and to that we must turn our first attention, studying all the time how we can most economically keep our stocks of all the domestic animals in the best possible condition to yield us a due and ample return for the care and labour we bestow upon them. And we may be assured that our success will be commensurate with this care and attention.

G. MOORE.

(1) Then why not sow grasses of a permanent and hardy quality in the fields.—Ed.

(2) Exactly our idea expressed twenty times in the Journal.—Ed.

(3) A timothy meadow, we presume, and the feeding off had torn up the roots as usual.—Ed.

PEANUT CULTURE.

(by Mr. John Craig, Experimental Farm Ottawa.)

Ottawa, March, 15th., 1897.

An article on the culture of this plant in Canada has for some time past been going the rounds of Canadian newspapers. In this article, successful peanut culture in Eastern Ontario was set forth as a glowing possibility; nay, more, as an assured fact based upon the results said to have been obtained from a single experiment! I do not wish to discredit in any way the work of this particular experimenter—such private work is laudable,—but, at the same time I would urge farmers to look into the situation somewhat carefully, in order to consider it in all its bearings, before engaging to any extent in the industry. This is a wise plan of action before taking up any new line of rural labour.

HABITAT.

It appears more than probable that to Brazil we are indebted for the peanut, in addition to three other plants of great economic importance, viz., cotton, corn and potatoes. Two of these (corn and potatoes) we cultivate with success throughout all the agricultural districts of Canada. Cotton belongs to the milder parts of the temperate region and is a companion of the sugar-cane and the peanut. (1) Virginia, North Carolina, and Tennessee produce a large part of the peanut crop of the United States. Its foreign cultivation extends throughout Brazil, India and Africa. Its most successful cultivation lies between the parallels of 36 degrees and 37½ degrees North latitude. It is grown to a considerable extent however as far North as the 40th. parallel.

CLIMATE REQUIRED.

Authorities on the cultivation of this plant say that in order to make a commercial success of growing it, a climate ensuring a season of five months freedom from frost is necessary. Peanuts may, also be successfully produced, in an amateur way, in many localities where they cannot be made to pay. Just as early varieties of grapes may be grown for home use throughout Eastern Ontario and Western Quebec by the exercise of judgment and skill, though they cannot compete with the Western and Southern grapes in the matter of quality, nor can they be grown profitably at the present time, so may peanuts be grown in favourable seasons in the same localities, as garden curiosities, with the exercise of extraordinary care. Peanut culture in the United States was an exceedingly profitable industry in Viriginia, Tennessee, North Carolina,

(1) Farmers' Bulletin No. 25. U. S., Dep. of Agr.

and the Southern States in the Mississippi Valley for some years succeeding the period of the Civil War. One hundred bushels an acre was at first an average crop. The yield does not now average over twenty bushels an acre for the peanut producing districts of the United States, and the industry in many districts, at the present time, is unprofitable. These low returns are brought about by bad methods in connection with rotation of crops and system of fertilization. Apart from this, the quality of the nut is much affected by environment: soil, moisture, and temperature. It is my impression that it would be folly for any farmer residing outside of the peach growing section of Ontario, to attempt the cultivation of this plant, except upon a purely experimental basis. This latter kind of work is always interesting though not always directly remunerative.

In speaking in this somewhat emphatic manner I do so from the standpoint of personal experience.

EXPERIMENTS AT OTTAWA.

Peanuts were tried here in a small way in 1892-3-4. Each year plants were started in pots in the greenhouse in April. These were set out in warm sandy loam about the time tomatoes are transplanted. Each year, the plants grew vigorously and produced a fair quantity of nuts, but only a small percentage of these were matured when the vines were killed by frost. Obviously, it would not pay to grow them under this method. Again, each season nuts were planted in well prepared warm soil after danger or frost was over. The plants, as in the case of those potted, grew vigorously, and each produced quite a number of partially developed, not to say mature, nuts before they were cut down by frost. The variety tried was the White Virginia nut. I believe the Tennessee Red is somewhat earlier, but I still doubt its ability to mature anything like a paying crop here, even under the most favourable circumstances. Peanuts, unlike tomatoes, or melons and other heat-loving plants, are easily preserved and may be readily transported at any time, so that, as in the case of cereals, distant localities are brought into direct competition with each other.

FODDER.

The fodder produced by the vine (after removing the nuts) of the peanut (Arachis hypogaea), like most of the members of the pulse family (pea, bean, clover, etc) is highly nutritious, comparing favourably with clover hay. The feeding value is greatly increased by allowing some of the nuts to remain on the vines. From this standpoint it might have some value in Canada.

EXPERIMENT SUGGESTED.

To those who are anxious to study the growth of this curious plant, which buries its fruit underground (1) after the latter begins to develop, I would suggest the purchase of a few nuts this spring through a trustworthy seedsman, so that seed of good vitality may be obtained. Plant these, after the danger of spring frost is past, a foot apart and two inches deep, in a warm, sandy corner of the garden. The soil should be mellow. If heavy, it may be improved by ridging. Give clean cultivation, scatter a little lime about the plants after setting out, watch the growth of the plant and the development of the nuts, and do not fail to report your success in the columns of the "Journal of Agriculture" next autumn. If you wish to increase your chances of testing a mature nut of your own growing, I would advise starting some seed in pots in the house, and transplanting them about corn planting time.

The above remarks have special reference to the province of Quebec.

(1) Hence its epithet: "Hypogaea." Ed.

DRAINING.

What land requires draining—How grain germinates—Effects of light, &c.—How water enters drain.

It is a remarkable fact, and one that is well worthy of consideration, that in those counties in the East of England where we find the earliest attempts at thorough draining, the practice of this remarkable art remained unimproved and was executed in a purely empirical manner; while over the rest of the country, men of really scientific attainments were conducting the operations, and producing ten times the beneficial effect with no additional outlay.

I observe, in an article written some time ago, by a Canadian gentleman well skilled in agriculture, that a drainer was imported at a great expense from Britain, and a large subsidy paid to a brickmaker to embark in tilemaking; and an idea crept into my brain, that it would have been as well if, before importing the man, the importers had settled in their own mind what he was to do. I have no doubt he thoroughly understood his business at home: the climate, the soil and the rain-fall must, if he had gone to work here, have soon convinced him that his pre-conceived plans would need alteration.

I do not speak without having not only thought upon the subject deeply, but also followed out my thoughts in practice. I have drained several hundred acres of land on my own account, and inspected the drainage of several hundred acres more, besides having constantly watched the operations of Parkes, Morton, and other well known engineers, employed to superintend the works under the Commissioners of the drainage-loans in England.

I began with bushes, next went to stones, then to horse-shoe tiles and soles, afterwards to pipes, and ended with the most perfect of all, pipes and collars. I have drained all sorts of land: light quicksands, heavy London clay, and loam on gravel.

All depths, too, I have worked at, from 20 inches, to 4 feet 6 inches, and occasionally as deep as 9 feet, for springs.

I know the cost pretty well, and I know how absurd it would be to attempt to introduce our permanent system into general use here. We have neither men to execute the work, nor money to pay them with if they did it. But there are cheap and effective ways of draining land, in our climate and with our soil, that might be employed with the greatest advantage to the individual farmer, and to the nation at large. "Eight bushels and a half of wheat per acre!" (1) Really, the last sentence ought to be suspended in large character in every village in the Province of Quebec: it is positively frightful to contemplate such a yield. And why are we so shamefully behind other countries? I answer, because, amongst other faults, our land is undrained. Do you imagine that the crop of nearly 40 bushels of fall-wheat per acre, grown by Capt. Campbell at St. Hilaire, had kept its toes in cold water all the spring? By no means; (v., Sep. number 1880) the land was thorough-drained 25 years ago, and no signs of stagnant water are visible over the whole piece.

(1) See Mr. Barnard's Prize Essay July No. 1879, p. 35.

Nobody knows better than I do, that large sums of money have been thrown away, by men having more money than judgment, in attempting to drain land in this country without having the least idea of what they were about. I have seen drains, the conduits of which were scraped by the plough at the ordinary furrow depth! I have seen drains, laid by those who ought to have calculated expenditure a little more closely, 14 inches deep and 14 inches wide, with large stones for top, bottom and sides. No wonder the ordinary farmer, seeing these follies, sneered at their perpetrators, and determined, if this were drainage, to have nothing to do with it. And how to win these properly disgusted men back to a calmer view I do not see; but I will try to show them how land may be drained cheaply and effectively with materials to be found on their own farms, and if I can induce one farmer in every county of the Province to attempt to follow out as much of my plans as may seem reasonable to him, I shall be satisfied: for I am sure that if the work be done in a careful, painstaking fashion it will not be long before his example is followed by his neighbours.

And first, let us see what land wants draining, and why.

To understand this question thoroughly, we must consider what things are necessary to the germination and growth of the seeds we commit to the bosom of the earth. They are, as far as we know, three in number, viz., air, heat, and moisture. A seed in a healthy state is a living object, in a state of repose, but ready to spring into active life the moment it meets with the three concurrent necessaries above mentioned. What is the exciting cause of the vitality of seeds we do not know—it is one of Nature's secrets which she has not yet imparted to man; but we do know what is necessary to excite this vital spark into action, and it is our business, as farmers, to take care that we foster, and not impede, the efforts of the great mother for our advantage.

If any of my readers have access to a malting establishment, an inspection of the barley on the floor and couch will give them a better idea of the germination of seeds than the longest description. They will see that, on the third or fourth day after the grain has been taken out of the "steep," i. e. a tub of water in which the barley lies for 48 or 72 hours, according to its quality; they will see, I say, a small white bud springing from one end of the grain which, having just seen the light, shrinks from it, and, turning back, proceeds under the husk to find itself, on its exit at the other end, a green shoot or "plumule". Immediately after the appearance of this bud, the small white rootlets show themselves, and the plant is ready to take advantage of any food within its reach—up to this time it has been fed entirely with the starch contained in the seed, which, to secure its more facile imbibition by the infant germ, has been converted into dextrin, or gum, and then into sugar, by what is called the "Diastase," a substance formed from the "albumen", or nitrogenous portion of the grain. Hence, the sweet taste of malt compared with the original barley: the starch of the one has been partially converted into the sugar of the other; and the maltster takes care to place his "pieces" on the kiln to dry, before the plumule shoots forth into the green leaf, and begins to feed upon this substance. "With the assistance of this saccharine secretion," says Lindley, "the root, at first a mere point, or rather rounded cone, extends and pierces the earth in search of food; the young stem rises and unfolds its cotyledons, or rudimentary leaves, which, if they are exposed to light, decompose carbonic acid, fix the carbon, become green, and form the matter by which all the preexisting parts are solidified. Thus, a plant is born into the world, its first act having been to deprive itself of a principle (carbon), which, in superabundance, prevents its growth, but, in some other proportion, is essential to its existence."

We now see why light is not only not necessary to the healthy germinations of plants, but absolutely injurious. In light, the leaves absorb carbonic acid

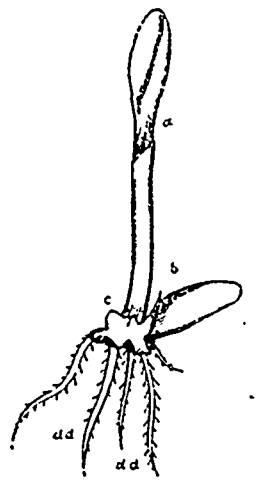


Fig. 1.

and give off oxygen, and seeds exposed to the light follow the same rule; but in a healthy process, the reverse takes place, carbonic acid is given off, and oxygen absorbed; and how can we better exclude light than by covering the seed with earth? But, as we observed at starting, the earth in which we bury the seed must be in a peculiar condition: it must, first of all, contain air. Though, at a casual inspection, the soil seem to be too closely packed to admit the air, looked at more narrowly it is not so, but the interstices between the particles of the mould will be found to occupy a fourth part of the whole mass. Hence, 100 cubic inches of soil, finely pulverised, contain 25 cubic inches of air; the depth of ploughing being taken at 8 inches, the number of cubic inches of air on an acre will be 12,545,280; and as every additional inch of depth pulverised brings into activity 200 tons of fresh soil, the ploughing one inch deeper will introduce into the soil 1,600,000 cubic inches more air.

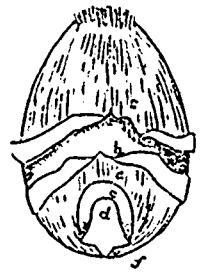


Fig. 2.

Thus, the deeper we plough, the greater amount of air we lay up as a store for the use of our plants.

Fig. 1 represents a grain of wheat magnified: "a" and "b" are the two skins, inner and outer: "c" is the cotyledon, and "d" the rudimentary plant, whence spring the root and stems.

Fig. 2 is a wheat plant germinated: "a" is a stem which has just left the sheath: "b" another starting: "c" another unevolved, and "d" the roots.

It will easily be understood, that when the land is left full of stones and clods, the air cannot penetrate these obdurate masses, and, in consequence, the roots in their tenderest stages are left to fight their own way under the greatest difficulties. Fig. III.

Fig. 3.

This air, again, must be above a certain temperature, or else the seed's vitality will remain dormant. Now, the more thoroughly pulverised land is, the more easily will it resist the induction of cold from without, and the less easily will it radiate its internal heat.

Besides clods and stones, the presence of water will exclude air. Fig. IV shows the seed lying in a well pulverised soil, the interstices of which are filled with water instead of air. Here, too, the seed cannot germinate freely; and, besides, water, during the necessary evaporation that takes place, produces cold: another hindrance to free germi-

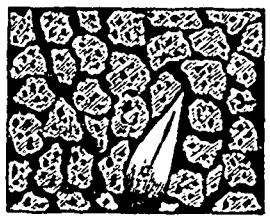


Fig. 4.

nation. On the other hand, entire want of moisture prevents germination, as much as excess; as may be seen in fig. V, where the seed is placed in pulverised earth, and the interstices filled with air, but no moisture is visible between and in the particles of soil. When land is in this state, heat can enter and escape from it with equal ease; so the evils of the want of moisture, and of excess of heat, are evident. In fig. VI, however, we see the soil as it ought to be: the seed lying in its comfortable bed: the air finds easy access between every particle of soil, and the general warmth of the season,

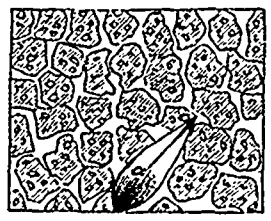


Fig. 5.

whether Spring or Autumn, finds an easy road to it; germination begins, and the future growth meets with neither check nor obstacle.

From the previous considerations we deduce the conclusion, that all soils which do not rest on a naturally pervious subsoil require draining. For, it will be seen, on inspection, that, where land lies wet in winter, cultivation in spring produces clods, instead of a finely pulverised surface; and instead of the early heat of summer warming the soil, it in reality chills it by evaporation. On such land, large belts of dark coloured earth may be seen in May, dotted about, here and there, among the lighter coloured parts: the plants want vigour when they start, their green is pale,

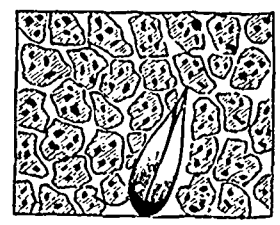


Fig. 6.

the herbage coarse, hard, uninviting. The tread is unequal, one part of the foot sinking deeper than the other: the stock never seem satisfied: the trees have hard bark, and are covered with parasitic plants: the roads are soft, and full of ruts: the ditches plashy, and always falling in: mosquitoes, midges, all sorts of horrible insects fill the air: the plough, scuffler, and harrow have double work to do, and, even with double work, never succeed in pulverising the soil into a fine mould.

(To be continued).

SEASONABLE NOTES

Reflection — Scientific Farming — Follow the practice of the neighbouring best men — Labour — Watch details.

FARM-ECONOMY.

No business allows of the exercise of economy more than farming. The idea conveyed is not exactly that of saving, for expenditure may be in strict harmony with economy. It is rather equivalent to "management," or the careful consideration of every detail, with a view to carrying each of them out in the best possible manner. There are periods in the agricultural year suitable for reflection, and none more so than the winter, when the pulse of Nature beats low and life is at its minimum. Such a time is favourable for looking into our methods, for, as President Lincoln said, you should not swop horses when crossing a stream. Similarly, you cannot alter your methods in the middle of work. Changes should be contemplated well before-hand, and winter is the best time for discussing points of management. Economy involves every branch of agriculture, and a few moments' consideration will show that it is more important than scientific attainment or even skill. These may be lavished upon wrong objects, but good management presupposes right objects. If science and skill are expended upon barren land, there is a fundamental error, for the effort is not worth making. So, if scientific knowledge is brought to bear upon crops not fitted for the soil and climate, or stock not suited to the holding, or on fattening bullocks when only young stock should be kept, the knowledge and labour are lost. Management involves a keen appreciation of the larger issues, as well as of the minutest details, but it is of primary importance that the farm should be stocked and cropped in the manner for which it is naturally best adapted. Money has often been lost in farming because cardinal mistakes were made in the general outlines of the business. There may be no want of capital or of knowledge. The fault consists in persistently following a wrong system unsuited to the climate and the nature of the soil. Such mistakes are often made by men of undoubted ability and strength of will. They ride their hobby to death, and will not condescend to follow the less ambitious practices of their neighbours. Farming heroics seldom pay, and to them are to be attributed in a great measure the occasional failure of model farms and "scientific" farming. Examples could be given, for they are only too numerous. They have often been described in glowing terms and held up for imitation by the Press, but not unfrequently have ended in loss and vanished from the scene after a few years. Such cases show the necessity of conducting farming upon proper lines suited to the soil, climate, and markets of the district. The practice of a neighbourhood always deserves the highest respect. It has not been invented by any one man but is the outcome of experience and growth. It is, in fact, a true case of evolution and survival of the fittest. Improvements may be made, but radical changes are dangerous and liable to entail heavy losses. In most cases the practice of the neighbourhood carried out with spirit and careful attention to every detail will be more likely to succeed than an entirely new system. Economy presupposes a reasonable rent, judicious cropping, the right description of live stock, well-balanced labour, both horse and manual, and rigid attention to details. Each of these considerations might well occupy attention. Take cropping for example: it is certain that mistakes are made by sowing crops not quite adapted for the character and condition of a field. Much consideration is required before deciding even as between wheat, barley, or oats, and it is the same with the selection of the various root and fodder crops. The situation may be too high up for rape, but turnips would still do well; or it may be the wrong place for mangel, but suited for the hardier swede. The field would, perhaps, be better in roots than in corn, and in another case a good quality of barley may be expected after wheat. Grass may be better broken up, or it may be that the wise course is to let it lie a year longer. Experience shows the vast importance of cropping land to the best possible advantage, and the difficulty of so doing. There are a number of economical points deserving attention, some of which we may consider. First there is the question of implements. It is noticeable that many successful farmers work with old-fashioned implements, and yet obtain excellent results. Still, it must be allowed that a labour-saving machine is a good thing. Double or triple ploughs are in use on many farms, and give satisfaction, and on light lands they might be more generally employed. Two-horse drills and three-horse spring tooth cultivators are wonderful aids to horse labour. Horse-rakes, hay-tedders, reapers, mowers, harvesters, straw elevators, are each and all valuable aids to economy, and if horses can be relieved from tillage by the use of improved ploughs and cultivators, they can be the better spared for operations in the hay and corn fields. A craze for new implements is to be deprecated, but the adoption of tried instruments, which really effect a substantial saving, is true economy. The subject of improved implements is well worthy of attention at the present season, and time would be well occupied in inspecting them when at work—not so much in trial fields at shows as on the farm. As to the economy of steam cultivation, it has not been so generally appreciated as was expected thirty years ago. Horses still do the bulk of the tillage work on farms, as they can now be used with much greater economy than in the times of dear horse corn. It is too large a subject to enter upon at present, but light-land farmers find horse labour best, especially since the introduction of improved tillage instruments.

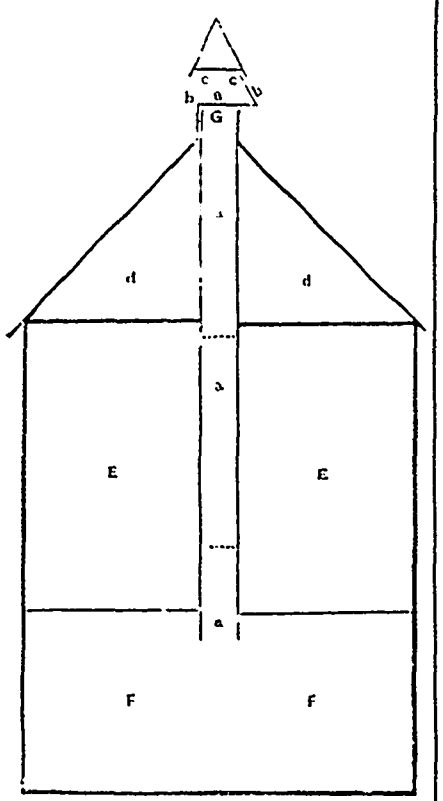
Labour is perhaps the most serious expense in farming, and economy demands that it should be regulated with the utmost care. I remember a leading Midland agriculturist expressing an opinion that we wanted to spend more labour rather than less, and by this he probably meant that in all well-bestowed labour there is profit. It must, however be remembered that the capability of the soil to produce is limited, and that even under the best circumstances it can be readily gauged. The pays must be kept down to the lowest point consistent with the best management, and the fortnightly sheet should be rigorously watched. A good manager places his men to the best advantage, and guards against all useless expenditure of labour. This is a daily burden which must devolve either upon the master or upon an experienced foreman. A good man at the head of each department is a great comfort and help; and they can be found, for good masters collect good men around them, and keep them. A good head man, a good shepherd or herdsman, and good carters are essential to the good management of a large farm. If observed to be negligent, lazy, or inefficient, they should be dismissed, and a good farmer will be capable of judging as to their merits. It is not expected that the farmer is himself an accomplish shepherd or carter, and he will listen to what his men have to say with attention, but nevertheless the responsibility must rest upon him, and he should be able to judge as to the merits of every suggestion. True economy demands that every day we should think if any saving can be effected, for even one shilling a day is important. By careful thought it is possible to effect improvements in arrangements which constitute substantial advantages in a year, and this is especially true in questions of labour. If we could only manage perfectly, farming would pay much better than it does. Economy is exhibited in the purchasing of seed, of fertilisers, of foods, of stock, and in all sales. The leakage must be great unless every item is scrupulously watched and discussed. The matter appears to be beset with very great difficulties, for even the best managers cannot be always on the stretch of attention. It is, however, less difficult than at first sight appears, because the farmer, if alert and interested in his business, will receive great assistance from his leading men, who are always influenced by the care shown by the master as to the carrying out of details. Good masters make good men, and there is something noble in the devotion shown by good servants when they are in sympathy with their master. Of dishonesty there is always some danger, but a dishonest labourer is soon found out, for we may be sure that seme one will sound a note of warning if petty larceny or arrant laziness are indulged in. The master must always keep his eyes and ears open, and his presence is in itself a safeguard. Upon a large farm there must always be a good many pounds lying about which might be saved. There are old implements which might

as well be sold, thriftless animals, heaps of fertilising matter lying by the roadside, wasted straw, wasted manure, unsapplied labour, &c., &c. We are none of us perfect, and I speak from experience, but at the present season we may well think over our shortcomings and misdoings and endeavour to apply a stricter economy in all departments.

JOHN WRIGHTSON.

VENTILATION OF STABLES.

"Ed. Hoard's Dairyman:"—Much has been said and written on this subject, and yet I am inclined to believe that men are either slow to comprehend what constitutes good ventilation, or indifferent in their action. No doubt both are true. It is no uncommon thing to see new barns, covered with matched ceiling, cornice as tight as a house, and not an open space anywhere to permit the egress of odors from the stable. Most modern barns in this section are built on a sloping piece of ground with a southern view preferred. The stable is built upon the level, while the barn proper is directly over, with posts anywhere from 18 to 28 feet—common height being 22 to 24 feet. As the entire weight of hay and grain is above the cow's stable the matter of proper support becomes an important one. This may be accomplished in two ways; either by double girting beams, with a sufficient number of under posts, or by strong truss rods, on the plan of bridge supports. As the hay and grain in these barns is over the stable, the warm air from below is ever seeking an escape to some point at a higher elevation. In most barns, this is accomplished by the warm air rushing up into the upper part of the barn. The result is, the warm air coming in contact with the colder air above is condensed and forms frost on the roof and all upper



a, a—ventilator; b, doors; c, hinges; d, loft; E, bays; F, stable; G, rod connecting doors.

portions of the barn. When warm days come, the frost melts and drips down over the hay. The result can only be injurious.

I have carefully noted every device I have seen any description of, and finally adopted the following plan. The accompanying cut shows the end elevation of barn, which is 40 feet wide and 60 feet long—F, the stable, is underneath the whole barn, has two drive-ways at the outside, wide enough for a team and sled or wagon to pass and take out manure. The two rows of cows face towards the center, where is a feeding alley 12 feet wide. The ventilating shaft, a a a is ceiled tight with matched pine, and is about 3½ feet square inside. This extends down into the stable just far enough not to interfere in passing under it, thence up through the bay, and so on up through the roof and some five or six feet above. There are hinged doors along down the bay, indicated by dotted lines, which are opened to throw down hay and then closed again. The doors or sides of the shaft extending above the roof, b b, are hinged at c, c, and connected by rod g, so when the wind blows from the south it will shut the south door and open the north one; when the north wind blows the case is reversed. As the shaft is nearly 60 feet long there is a strong draft. If there are other hay shutes or air passages from above left open, there is likely to be a downward draft through them bringing the cold air from the upper part of the barn. These we close, and the air is admitted in various places in small amounts sufficient to make a continuous supply, and yet not create a strong draft of cold air.

I can take a small handfull of wheat shorts and throw it in to the foot of the shaft, and it will be carried up and out at the doors in the top. The best proof so far of its value, seems to be that so far there has been no collection of frost on the boards in the top of the barn. The Veterinary Surgeon connected with the New-York Condensed Milk Co., pronounced it superior as a ventilator to anything he had seen.

The results are most satisfactory so far as I can see.

J. D. SMITH.

Delaware Co., N. Y.

WHAT CROPS TO RAISE FOR FEEDING.

Corn—Mangels—Grain and pulse.

I have about six acres of good rich land. What will pay best to plant there next spring in view of feeding the cows next fall and winter? X.

"Niagara Falls, N. Y.

Indian corn, when properly planted and cultivated, gives the largest yield of forage per acre of any of our ordinary crops; therefore corn should furnish the foundation for fall and winter feeding. Plant in drills, kernels eight inches in the row, the largest or most rapid-growing variety of corn which will pass the "milk stage" before the first frost usually occurs.

Before the corn comes up, cultivate and harrow, thereby "stealing a march" on the weeds. In ten days to two weeks cultivate or, if on sandy, light land, harrow instead. Every ten days thereafter until the corn has all tasseled out, cultivate with an implement which has more and smaller teeth than those in common use, taking care to cultivate deeply at the beginning and more shallow as the season progresses. Do not hill the corn.

In addition to this, prepare in the best manner possible one or more acres of clay loam land and give a dressing of from twenty to sixty bushels per acre of quick lime on the surface after it is plowed. Plant mangels early in drills thirty to thirty-four inches apart. Run a hand cultivator through one or more times when the plants are large enough to bear it. After that cultivate with the horse hoe thin, and dress up with the hand hoe. From this time on mangels are as easily raised as corn, provided the preliminary work has been done well. It may be well to run the hand cultivator through just before the plants appear above ground, if the seeds have been planted so that the rows can be readily followed.

Thirty tons of mangels per acre should be secured; forty tons is a large yield. Since more or less hand labor is required in raising roots, it is economy to raise the forty tons on one acre instead of two.

If there is any vacant ground, unseeded, oat, wheat stubble and the like, plow it as soon as the crop has been removed, cultivate occasionally until August 1st to 15th and sow a mixture of one bushel of peas, one of barley and one of rye per acre.

At this writing, November 27th, a field of oats and peas (barley and peas would have been better) which was sown the 15th day of August is now from twelve to twenty inches high and yet green and luxuriant. From this piece of land was cut this year a good crop of wheat when in bloom which was fed to the cattle. The ground was then thoroughly fitted and seeded to Hungarian grass. This, in turn, was cut when well headed out and fed in the stables.

The aim should be to keep all land covered during the entire growing season with young, vigorous plants of some kind. Soil, like individuals, becomes lazy when not kept at work.

If the corn is used for ensilage, it will naturally come off early, and it is wise to start a second crop of some kind at the time the last cultivation is performed. Here may be used turnip seed, crimson clover or barley and peas sown from horse-back ahead of the cultivator. The last cultivation should be at least two weeks later than the time usually selected for "laying by" the corn. If the corn has not been planted too thickly and the land is kept in proper tilth and is fairly fertile, a large quantity of valuable fall feed may be secured from the same land that grew the corn.

As to what class of plants will give the best results when used as a catch crop, experience can alone determine.

I. P. R. "Country Gent."

Rotation of Crops.

New-England rotation—Root-feeding—Plants vary—Leaves.

Rotation of crops is leaned upon as one of the sources of increased plant food required in extensive tillage in a section where nature has done practically nothing to supply the annual needs of crops essential to progressive agriculture. In a general way rotation is regarded by the masses with favor as a method applicable to other conditions than their own. The present change of crops is not by them regarded as a thought-out system, but as one adapted to their markets without reference to soil conditions and as an aid to crop growth. In this they are right, and yet I believe wrong in ignoring a systematic rotation in practice. The common rotation of New-England, or that which passes as a rotation, is corn, grain and hay until the latter crop runs down to from three-quarters of a ton to even one-quarter of a ton, covering a period varying from five to eight or more years. None of the essentials of rotation are involved in it, when taken as a whole. The essentials of a rotation and those that led me into the adoption of one may not unprofitably be summarized. Sustaining reasons compactly stated may properly follow.

First, roots of crops occupy different depths of soil—oats, barley, wheat etc, occupying greater depths than corn; clover roots still deeper; forming a reason for rotating crops that feed at different depths from each other. Second, the varying acids secreted by different crops dissolve from the soil, with unlike ease, the different materials of plant growth. So it is that one crop can help another, and still a third easier than another, and still a third easier than either to phosphoric acid. As roots and stubble of crops vary in weight and composition, in turning them under, we turn under different quantities of plant food, and in varying proportions. As an illustration, clover ordinarily furnishes over three times the weight of roots and stubble that other crops do. As this crop is also very rich in nitrogen, a material that it grains from natural sources, it furnishes to succeeding crops more nitrogen than they require. This becomes important when the succeeding crop is wheat or some non-nitrogen-gathering plant.

The points mentioned find illustration in the old table of German origin which in part is given below:

	Am't Roots.	Nitrogen.	Phos. Acid.	Potash.
Wheat	2240 lb.	22 lb.	11 lb.	17 lb.
Barley	1515	22	11	9
Oats	2200	25	28	24
Rye	3400	62	24	30
Clover	6580	180	77	77

Plants that take largely of a given material as a rule have a higher power of gathering it, and in their roots and stubble feed a succeeding crop that takes but little of it through a low power of securing it. The table also shows clearly the impropriety of succeeding a crop by itself, for a plant taking largely of a given material will exhaust the soil of that material in undue proportion. The potato crop makes this point more clear, for to every 35 lb. of potash taken out by it there is required but 11 lb. of phosphoric acid. In the case of wheat, 24 lb. of potash are required for the whole plant for each 20 lb. of phosphoric acid.

When yard manure is the fertilizer, 24 lb, of potash is supplied for very 12 lb of phosphoric acid. This manure would fail to supply wheat (a crop with a low power to gather phosphoric acid) with this material long before the potash supply had been exhausted from the manure.

Again, each crop has its own variable demand upon water supply, oats throwing off 501 lb. for each pound of dry matter in their contents, while corn takes but 301 lb. per pound dry matter. It has been found that in the spring succeeding a given crop, the water supply of the soil on which it is grown is far different from that of soil growing other crops. As water supply determines largely the crop, it is important in many seasons that crops requiring it in large supply be succeeded by those requiring a small water supply. Babcock found that a crop crossing plats that had grown other crops the year before gave yields proportionate to the water of the soil, the water of the soil varying over 10 per cent., or several hundred thousand pounds per acre between a followed section and

one bearing corn. European trials have shown similar results. Small water-taking crops follow better large water-taking crops.

Again we have the varying powers of leaves to draw upon the atmosphere for food supply, and the necessity of changing crops, that insect and fungus enemies which prey upon them above and below ground may be baffled, for these enemies of plants have their special crops as feeding grounds. They accumulate in soils on which a crop is constantly grown and are reduced when the crop is taken to new areas on which they have found no substance for a time.

I have generalized, for the use of the abundant and conclusive data at command would require serial letters and carry me beyond the intended scope of the article.

The evidence that will be most conclusive must be drawn from the crops themselves. Sir John Lawes received, when barley followed barley, 32.75 bushels, and when barley followed clover 58 bushels of barley. (1) In trials in Missouri and Utah I found great gains for rotations; aggregate crops of 13,510 lb., where wheat followed wheat became 25,561 lb., under a rotation. These combined with unmentioned reasons have induced me to lay out an eight years' rotation. This will be given in the future.

J. W. SANBORN.

"Belknap County, N. H."

"Country Gentleman."

MOTIVE POWER FOR BARN MACHINERY.

On reading the letter signed "B. W." in this week's "Agricultural Gazette" under the heading of "Motive Power for Barn Machinery," I am induced to give my experience of an oil-engine after one year's trial.

I have a 6 brake horse power oil-engine which I use in driving a double-blast thrashing machine of 3½horse power; also corn mill and chaff-cutter, which are generally used separately, but occasionally I use the chaff machines and thrashing machine at the same time, but, instead of putting the sheaf through the thrashing machine, merely thrashing off the beard, I find it more convenient in chaffing. The engine drives them both very well.

I can start the engine in twelve minutes (or less ofttimes) after lighting up. When started I can and (frequently do) leave her for one and sometimes two steam-engine. The cost in oil at 6½d. (2) that is a distinct advantage over the steam-engine. The cost in oil at 6½d. per gallon (price now giving) for eight hours' work is under 3s. She is simple in construction, easily managed, and I may say there is less risk of fire than with the steam-engine. Unless "Farmer" can get coal for a very small sum, I should strongly advise him to go in for an oil-engine, which, of the same size as my own, could be put in complete for a trifle less than £100.

Now, I put it to "B. W.," can he work a steam-engine of like power (which would be about 4 nominal horse power) for less than 3s. for eight hours, or even for 3s. for eight hours? Further, how much less than £100 can you get a steam-engine for a 4-horse power, delivered and fixed?

(1) This is new to us. In England, barley never follows clover: just the reverse.—Ed.

(2) Say 12 cts; 3s—72 cents.—Ed.

Steam-engines may be best where much power is required, but for driving farm machinery I think a good oil-engine is cheapest and most simple.

"Cornwall."

In reply to your correspondent of September 21st, with regard to the respective advantages of steam or oil as a motive power for barn machinery, I may state that I employ both, and that I infinitely prefer the latter. I have a petroleum engine, fixed in an ordinary wooden outbuilding, connected with my dairy—no especial precautions being taken to exclude dust—to drive a Laval separator. For six months it has worked, and is still working, most satisfactorily, under the superintendence of my son, who has found no difficulty whatever in its management. I think of substituting an oil-engine for the steam-engine of 4 horse power which I am now using in my barn, and should get one from Messrs. Petter and Sons, Yeovil, who supplied me with the one which I am at present using for milk separating. The cost of working my 1-horse power engine is very inconsiderable, and the method of driving it is as simple as possible. The cost of a 1-horse power engine is £31 10s. This size will drive a 9 in. chaff-cutter.

H. J. GULLEY.

"Wincanton."

NOTE.

The following, which has been sent us for publication from an unknown source, has no heading, so we entitle it:

NOTES ON FARMING.

Fertility—Lawes' work—Exhaustion—Drainage Irrigation Autumn cleaning—The roller.

Other things being equal, we should expect that sheltered situations, with a southern aspect, would be those in which we should find the capability of any given soil best exhibited. But though soil, and rain, and duly tempered warmth favour us, these, and many other considerations besides, may fail to determine, in every case, whether this or that plant may be grown within particular limits. That also depends on the presence or absence of its proper foods, and it is here that Art is available for meeting the defects of Nature.

The maximum of fertility in the natural state is a rich pasture capable of fattening an ox and two sheep on an acre. Such soils are exceptional, though in most countries they are to be met with.... The minimum of fertility may be exemplified by a bleak mountain pasture, where ten acres will barely maintain a small sheep.

The artificial maximum and minimum which result from the treatment of soils of the same quality are more instructive, and may be clearly exemplified by taking two of the experiments which have been carried on by Sir John Lawes of Rothamsted for the last fifty years. Confining the comparison to the average of the twelve last years, the following was the weight in pounds of an average crop:

	Corn lbs.	Straw lbs.	Total lbs.
Wheat Grown continuously without manure	730	1,120	1,850
Wheat Grown continuously with special manure	2,340	4,928	7,268

The soils here are exactly similar and in the same field: strong land on clay with a substratum of chalk; the management is the same, in so far as culture is concerned, both crops are kept equally clean and free from weeds, the same seed is used, and they are exposed to the same changes of weather. The only difference is, that in the one case nature has for thirty years been unassisted by manure, and in the other, the soil receives every year the various kinds of manure which have been found most suitable to the crops. The result of this treatment is a return of three times the weight of corn and four times the weight of straw for an expenditure of manure which leaves a profit of 100 per cent on its cost. In both cases, the wheat is grown continuously year after year.

EXHAUSTION OF FERTILITY:—The effect of continued cropping, without manuring, is to reduce the stock of available fertility in the soil. But, since it is the minimum of any one essential ingredient and not the maximum of the others which is the measure of fertility, it follows that a soil which is exhausted for one plant may still contain an abundant food supply for a plant of another kind. A rotation of crops will in such case defer the period of exhaustion. But, whatever the crops, cultivated, it is plain, that continued cropping without the use of manures must ultimately bring us to a time when the crops grown will no longer pay the cost of cultivation.

LAND DRAINAGE:—Whatever the composition or natural capacity of a soil, its fertility depends materially upon its relations to the water which falls upon it. If the rain water has free access throughout it, free passage through it, not only are ingredients added which the roots absorb for the nourishment of the plant, but these ingredients are available in the laboratory of the soil for those purposes by which plant food is manufactured from the material of soil itself, and from the manure added to it; and, above all, the full use is obtained of a necessary carrier of plant-food by the hungry mouths, the absorbent ends of root-fibres, to which it must be brought. Upon the permeability, as well as on the composition of a soil, its fertility is thus very materially dependent; and land-drainage, either natural or artificial, is essential to it.

When there is an excess of water in a soil, and no provision exists for withdrawing it, the interstitial canals become completely filled, to the exclusion of the necessary amount of air on which the activity of the soil, considered as a laboratory for the providing of plant-food, depends.

SOILS SUITED TO IRRIGATION.—Light porous soils, and particularly gravel and sands, are most improved by irrigation. Tenacious and clay soils are seldom benefited by it; never, except in connection with through drainage.

ON MIXING SOILS.—Soils, which possess conspicuous defects in their physical and even in their chemical properties, may in many cases be rendered fertile and productive by a proper mixture. Loams, indeed, which are the most productive kind of soils, are naturally produced in this way, being a mixture of sand and clay. The nearer, therefore, we can bring a soil of a different nature in approach to this character, the greater, probably, will be its improvement.

Let us add that, by opening the soil, and rendering it permeable to air and water, the inert materials contained in it, both organic and inorganic, are convertible into soluble plant food.

CULTIVATING OR STIRRING.—The cultivator merely stirs the soil and does not turn it over like the plough; but it can work to an equal depth. It is especially useful in a spring fallow after autumn-ploughing, as the winter weathered tilth is thereby retained on the surface, and the moisture of the soil is less evaporated than when the land is spring ploughed—a point of the first importance in root cultivation. It is also much used in preparing light land cleared of roots for being sown with spring corn and seeds, as it furnishes a fine mould and keeps the manure near the surface. (Very sound doctrine indeed: Ed.)

ROLLING. (1) breaks those clods or lumps which have resisted the action of the harrow; (2) it presses down surface stone, etc., so as to be out of the way of the scythe or reaping machine; (3) it gives a greater degree of compactness to soil which is too light and friable, making it firmer round the roots of plants, and at the same time a less favourable breeding ground for many kinds of insects; while the smoother surface presents fewer points of evaporation; (4) it presses down and makes firm the ground about newly-sown seeds, and sometimes (5), when very small seeds are to be sown, it is well to roll the ground first, so as to level it thoroughly, and facilitate a more equal distribution of the seed than could otherwise take place; and (6) it is used to press into the ground the roots of those plants sown in the preceeding autumn which have been detached by frost.

Grass land cannot be too heavily rolled; and on all light lands under tillage the use of the roller is indispensable for closing the pores and preventing the evaporation of moisture. (1)

But while rolling is of much benefit on light, porous, and lumpy soils, it is injurious on wet clays, except in dry weather, when they are lumpy after ploughing. (2) Rolling a stiff soil when wet renders it more difficult of cultivation, by pressing the particles still more closely together, and preventing the admission of air. Even light arable lands require the ground to be dry when rolled, if for no other reason than that, otherwise, the soil will adhere to the roller. Grass land, however, is best rolled in showery weather. (3)

STUBBLE CLEANING AND AUTUMN CULTIVATION.—Two great objects of tillage, pulverization of the soil and destruction of weeds, are greatly facilitated by stubble cleaning and autumn cultivation.

As the weeds are in their weakest condition just after the corn is harvested, that is the time to attack them. The most effectual plan of doing so is to broadshare the stubbles. Previous to this, however, deep-rooted weeds, like

(1) Very good indeed. At Compton, in 1872, there were hardly any rollers at all; in 1884, the late Major Kellam told us there were at least twenty. Ed.

(2) On cloddy land, in preparation for roots, try rolling the ploughed land before harrowing. An old favorite plan of ours. Ed.

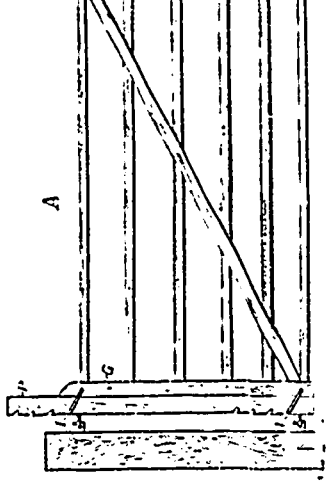
(3) Just off the damp or "clung." Ed.

the dock, should be pulled. Then, the broadshare cultivator may be run over the field, taking care not to cut the roots of the remaining weeds, but to cut under them, and so to loosen the soil, and the whole of the weeds upon it, that they can be shaken out by the harrows and gathered into heaps. It is not necessary to burn the weeds if there is any objection to that plan. They might be left on the ground, if dead, to decompose; but as that will interfere with the work which has to go on, a compost may be formed of the weeds with quick lime, road-scrapings, etc., The quick lime, if used in the proportion of one-eighth, will speedily decompose the weeds, and the compost will be ready to apply to the land in the spring. (Good. Ed.)

Pulverization of the surface soil will be brought about by these operations, but clay, generally, will be further benefited by deep ploughing and exposure to the winter-frosts. The autumn tillage, however, as well as that at other seasons, should conform with the requirements of the cropping which is to follow.

THE HELPING HAND.

Adjustable Snow Gate.



F. W. C., Middlesex Co., Ont.—A represents a gate that may be hung at different heights from the ground. If it be raised slightly there will be a space between the upright (G) of gate and the notched upright which is hinged to the post. The gate is next pushed towards P, and the irons (I and I) are freed from notches The gate may be raised to the required height to avoid the snow. The notched upright swings with the gate, and the irons (I and I) are only bolted to gate.'

The Dairy.

THE BALANCED RATION.—A very frank admission appears in "Hoard's Dairyman" for the 26th February, regarding the oft quoted "balanced ration" of the German chemists. After explaining, for the information of a correspondent, what a balanced ration is, the Editor goes on to say, very sensibly, that a cow that gives 60 lbs. of milk daily, containing 2 lbs of casein, will necessarily require more casein-producing food, i. e., protein, than another cow that gives only 25 lbs. of milk daily containing only 1 lb of casein But, when the 25 lbs of the one cow's milk contains as much fat as the 60 lbs. of the other cow's milk, and this often happens, it stands to reason that the one must need as much fat in her food as the other. Hence, what may be a well balanced ration for one cow, may by no means be a well balanced ration for another. "This fact," continues the writer, "has caused us to lay less stress upon the so-called nutritive ratio in recent years than formerly, and less than most writers on this subject now employ". And this is the conclusion that we have long felt must be ultimately arrived at by all sensible practical men.

SKIM-MILK.—As to what should be done with the skim-milk—after the calves had their fill of it we presume—, Mr. Van Dresser, N. Y. F's Institute, would give it all back, in a fresh state, to the cows; and, where butter is made on a large scale, this is as good a way of disposing of it as any, as the protein in the milk must tend to keep up the vigour of the cow. But Mr. Van Dresser's reason for not giving it to the pigs is good: "We don't keep pigs because we do not like them, and I won't have any body or thing around me that I don't like."

Mr. Smith remarked that Mr. Burell, of Little Falls, feeds separator milk, mixed with oil-meal-jelly and wheat-middlings, to calves, and last year his skim-milk thus used paid him 47 cts a hundred pounds. The milk was not such as is commonly found in the receiving-vat at creameries—24 to 48 hours old, putrid and foul. All vats should be cleaned out regularly every other day, and, if the milk has to be kept more than one day, a steam-jet should be let into it and the temperature raised to 150o F; and so with the whey vats.

TOO MUCH PROTEIN.—Speaking of a proper ration for milch-cows, a correspondent of "Hoard" asks if the following is a good one. Ensilage 40 lbs., bran 4 lbs., corn-meal 4 lbs., timothy-hay 8 lbs., and as much straw as the cow would eat. To this the reply is: "The ration is good in every particular except in the amount of digestible protein, which is nearly a full pound short of the amount called for in the standard. If the cows are doing fairly well, the present instance furnishes another fact tending to prove that less protein is required than has heretofore been deemed necessary." Very pleasant, indeed to read such sensible remarks. Evidently, the Editor of "Hoard" is one who is prepared to resort to the good old rules of practice where the rules of pure theorists do not seem to answer. It will, before long, be rediscovered that the carbo hydrates, as Lawes says, have a great deal more to do with the production of meat and milk than simply to keep the animal in force and heat. See p. of this number.

MILKING MACHINE.

THE (THISTLE) MILKING MACHINE AT FRITZOW, COLBERG, LINDENBERG (Milch Ztg., 25 (1896), No. 28, p. 446).—The working of the machine is described (see E. S. R., 7 p. 70). After using it for two months, the writer states that although he was somewhat sceptical at first, he is thoroughly convinced of its utility. The cows are milked at once, requiring about five minutes each. For milking 82 cows only one man and a boy are required.

The milking is entirely satisfactory, and the yield of milk has increased over hand milking. No trouble has been had with the machine from the first day. It is believed that it will pay for itself in a year.

"Experiment Station Record."
(Vol. VIII., 5, 1897.)

IRISH CREAMERIES

Watersupply—Drainage and ventilation Treatment of cream—Salting and working—Boxes and parchment paper—Treatment of milk—Testing Separators—Tabulating work—Process described—Petersen's Pasteuriser—Measurement of acidity,

In an article by W. L. Stokes on "Irish Creameries" we find the following remarks:

"1o.—The greatest error which can occur in the working of a Creamery is to have an inefficient water supply, for without a good supply of pure spring water it is impossible to make a fine quality of butter. It is an error which occurs rather frequently in Creameries, otherwise, we should not hear so much of the difficulties of cooling cream in summer, nor would the market in close, muggy weather be flooded with overheld and bad flavoured butter.

2o.—Another error occuring in connection with creameries is defective drainage. Many creameries are built too low, and it is difficult to get the drainage from the churns, etc., to run off freely. The purification of dairy sewage is too wide a subject for this article, but something can at least be done to prevent an unpleasant odour in the immediate neighbourhood of the creamery itself. The surface of the ground round the creamery should be kept as clean as possible, and all drains should be opened and concreted, and must be inspected frequently and regularly. The road leading along that side of the creamery where the milk is taken in, and where the separated milk is given out, should be closely paved and concreted.

3o.—Another error, noticed occasionally in creameries, is the want of adequate provisions for ventilation, especially in buildings which have been adapted to suit the purposes of a creamery. Too many creameries depend for their ventilation on the doors and windows, and have practically no air currents through the roof; the remedy is obvious and easily applied.

4o.—Some of the principal errors in a Creamery occur in connection with the treatment of the cream. In most dairies soured cream is churned, and the cream is usually allowed to ripen in Swartz cans placed in a cooling tank. No particular method is employed to determine the proper ripeness of the cream; in fact, the aroma and taste are almost entirely relied upon to tell that the cream is fit for churning. There is no skill required to determine the acidity of the cream, and it has been proved beyond doubt that, when cream has developed the equivalent of ⅞ of one per cent of lactic acid, it is fully ripened, and any further development of acid results in the production of a butter which will rapidly become bad flavoured.

5o.—The errors in salting and working butter are not so common as they used to be, though one occasionally finds in a Creamery a butter worker which cannot be instantly thrown out of gear. Streakiness in buter is becoming almost uncommon; but one frequently meets with butter which has been overworked in the endeavour to press out the water and incorporate the salt. It is not possible to add water to butter unless the water be at a temperature considerably above 70o Fahr.; but, by careless working, the butter can be made so soft that the worker cannot press the water out of it. A little care and foresight can obviate this. When the butter is taken out of the churning in a granular condition, it should be spread evenly on the butter worker and carefully salted, turning over the butter with a pair of Scotch hands; then, set the worker in motion, giving two or three turns, and remove the butter to a slated slab, where it should be allowed to stand and drain for two hours at least, after which it can be reworked.

6o.—The errors in the making up of butter are still noticeable in spite of the frequent warnings and advice upon this matter. Rarely a day passes but what one hears of pyramid boxes coming to grief and the butter oozing out from the broken sides; and still more frequently the vegetable parchment employed to line the box is used in too niggardly a manner, at the risk of the butter being soiled by dust and dirt before it reaches its destination.

7o.—There are one or two points in connection with the treatment of the milk which require notice. In winter, it is necessary to warm the milk, and few Creameries are properly equipped for doing this. Many are provided only with a long steam-jacketed trough, which is the worst possible arrangement for heating the milk, inasmuch as it is fixed behind the separator, and it is extremely difficult for the man in charge of the separators to keep the milk circulating freely in all parts of the trough whilst the separators are running. Some Creameries are without heaters of any kind, and heat the milk by blowing a jet of steam into the tank. The separated milk thus become adulterated with water, and, in most cases, the quality of the milk is affected by the water from the condensing steam not being pure.

Far too little attention is given to testing the separators in Creameries. They are often run far beyond their capacity. My own experience teaches me, that no separator will skim clean at its advertised rate if the temperature of the milk is below 85o, and the rate must be reduced as the temperature is lowered. Careful attention to separators will be amply repaid, because a difference of 1-10th per cent of fat in the separated milk would mean $100.00 a month to a fair-sized Creamery. The only way of accurately finding the residual fat in separated milk is by gravimetric analysis. The centrifugal machine, or milk tester, in spite of assertions to the contrary, is absolutely useless for determining the fat in separated milk. In all matters relating to Creameries, it should be borne in mind that it was not by mere superiority that the foreigner successfully seized on our markets; it was by uniform superiority. They, after, a successful and highly scientific study of the matter, arrived at the conclusion that, to produce an uniformly high class butter, the system of production must be carried on uniformly from beginning to end. Housing and feeding of cattle, attention to purity and cleanliness of milk, systematic extraction of cream at a given temperature, perfect ripening of cream, systematic churning, working, and packing; all the minutest details attendant upon each of these operations must be

adopted, and carried out in a perfectly uniform and systematic manner, before we can ever hope to command our own markets again; most certainly before we can ever hope to make winter dairying successful. Unfortunately, in this country, it is no new thing, on visiting various Creameries, to find some without any cream-cooling arrangements in the height of summer, and others with no milk-heating arrangements for the depth of winter. A great annual battle is being fought to put Irish butter on the markets in the spring time only, to take it off again in the winter, inviting with open arms our own destruction. It is surely easier to work on a regular and uniform system satisfactorily, than on an irregular one with all its attendant losses and dissappointments. There is no mystery whatever about butter making. The operation must be carried on under known conditions and on given lines. Neglect of these will result in anything from poor quality down to really bad, unwholesome butter.

In concluding my remarks upon this part of my paper, I would wish to urge upon every one connected with Creameries that, to properly find the errors in the working of the system, each day's work should be tabulated with the strictest accuracy, especially with regard to temperature of milk, temperatures and acidity of cream, amount of produce, and the quality of same.

The MODUS OPERANDI used in an Irish Creamery visited by the writer may be briefly described as follows:

The milk is received from the suppliers' tinned steel "Churns" (1) and delivered on to a spring balance weighing machine, where the weight and quantity is registered in imperial gallons and entered at the time in the books provided by the Society for the suppliers.

The milk is then elevated into a large cistern, whence it flows by gravitation on to a new and beautiful description of circular milk heater, known as Petersen's New Pasteuriser. The milk is here treated to a very high temperature, sufficient to kill the germs of bacteria, and it is thence passed on to the tinned steel auxillary heater before entering the separators. The skim milk, as it is received from these machines, is elevated into cisterns at the far end of the building, whence it is delivered into the suppliers, churns within an incredibly short time after the delivery of the whole milk: as loss of time is reckoned loss of money. The cream, as it is delivered from the separators, passes over a tinned copper refrigerator, where it is thoroughly chilled and then delivered into deep setting Swartz cans, where it is immersed in the coldest of spring water preparatory to being placed in ripening cans previous to churning.

The churning is a very important duty, and none but the head dairymaid in charge is allowed to interfere during the process; as the barrels are fitted with all the latest applicance, such as eyeglasses, ventilators, stop devices, etc., the dairymaid has no difficulty in ascertaining the necessary moment to stop churning, and the butter at this stage presents the appearance of finely-broken peas. By an ingenious device, the buttermilk is then drawn off, and some of the purest cold spring-water is introduced for the purpose of washing, which is continued until the water passes through without colour; this washing in the churn does not destroy the delicious aroma of the butter.

The butter is then removed to beautiful enamelled earthenware troughs, where it is allowed to drain off preparatory to placing on the rotary butter workers, where the salt is applied and incorporated in the proportions found most suitable to the demand, and which is generally about 3 per cent.

(1) A deep can so called in the U.K. Ed.

METHOD OF DETERMINING THE ACIDITY OF CREAM.

The apparatus for determining the acidity of cream is not costly, nor is the method difficult to work. The principal difficulty is to obtain a solution of caustic soda of proper strength, and to keep it of the proper strength whilst in use. This solution alters rapidly in strength by exposure to the air. This can be prevented by pouring a few drops of paraffin oil on the surface of the caustic soda and drawing off the solution, as required, by means of a syphon. The apparatus required consists of a burette, graduated in tenths of a centimeter, a burette stand, a porcelain basin of about 3 in. diameter, a glass stirring rod, a small 10 c. c. measuring cylinder for measuring the cream, a bottle of standard solution of caustic soda of such strength that 1 c. c. will neutralise 0.01 grain of lactic or its equivalent, a bottle of Phenolphthalëin Indicator, made by dissolving ⅛ oz. of phenolphthalëin in 4 oz. of methylated spirit.

To find the acidity of a sample of cream 10 c. c. are measured with the measuring cylinder and transferred to the porcelain basin, the cream which sticks to the sides of the basin being washed into the basin with the aid of a little cold water. One drop of the phenolphthalëin indicator is then added, and the caustic soda solution is added drop by drop from the burette until the colour produced in the cream no longer disappears on stirring. The amount of caustic soda is noted from the graduations on the burette, and if 10 c. c. of the cream have been used, each c. c. will represent 0.01 per cent of lactic acid in the cream. Thus if 7.5 c. c. of caustic soda has been added to 10 c.c. of cream before a permanent pink colour is produced, this will mean that the cream will contain 0.75 per cent of lactic acid, and that the cream is fully ripe for churning.

CARE OF MILK.

Negligence of the farmer—Care of milk—Bacteria—Cleanliness—Thermometer—Newly calved cows' milk—Two milk cans.

"Care to be given to the Milk, and process to be adopted for the manufacturing of butter during April and May."

In these times of advance and developement in our dairy industry, the farmer seems to be the only factor who is not exerting himself to his utmost. Despite the provision of cold storage transportation service, refrigerator boats dairy-schools etc. etc., all calculated to facilitate the placing on the market of our perishable dairy products, in as nearly a perfect condition as possible, and thus secure the very highest market prices if the article warrants it; despite these facts, the large majority of milk-producing farmers, still continue on in the same old slipshod manner, seemingly indifferent to the ever increasing competition and lowering of prices, and seemingly unaware that they have a duty to perform, not only in their own interest but in those of their Country, the Government of which has so ably taken the initiative in forcing and fostering the expansion of our dairy trade.

In many ways must our farmers change their methods and habits, and I purpose to try and draw their attention at present to but one item alone, the intelligent consideration of which, will do as much, I say advisedly as much (I am temptde to say, more), towards establishing the reputation of our dairy products, as the refrigerator service, and other Government assistance.

I refer to the "proper care and handling of Milk."

Now that as let it be distinctly understood bad milk makes bad butter, so good milk should make good butter; if it doesn't, it is the butter-maker's fault.

No farmer can deny that this lies entirely within the province of his own management; for he cannot surely expect the Government to keep his milk for him, and who will continue to be careless and slovenly when he realizes, as surely all must, that success depends entirely on himself, and that in acquiring proper methods in the care and handling of his milk, the farmer himself is ensuring the success of a Dominion enterprise, and is giving substantial aid, without which there can be no success.

The first thing to be borne in mind, is, that milk is naturally a pure product. If any milk is found unclean or unwholesome, the chances are that it is not the fault of the cow. In all such cases the presumption is that some person is to blame, either the one who cares for the cow or the one who handles the milk. Pure as milk may be in its natural state, it is a perishable product, and although, with a proper knowledge of its peculiarities and care in its keeping, it can be held in a wholesome state a reasonable length of time, there are natural changes which are sure to occur as soon as the opportunity is given.

This opportunity then must not be given; then, how must it be guarded against?

Scientists have discovered, that changes in milk are due to, and cannot take place without, the presence of minute organisms called bacteria. To obtain milk, and deliver it at the creamery, with a minimum, number of bacteria in it, must be every farmer's object. Of course, healthy cows are firstly necessary, and they must be fed on perfectly pure and suitable food, should have access to pure running water, and must be kept in a spacious, comfortable, well ventillated barn. Scrupulous cleanliness must be practised in milking, all the cows to be milked must be kept clean and free from dirty surroundings, udders must be well brushed and the milker's hands washed previous to milking each cow, and this it must be understood is absolutely essential, as the dirt in milk consists mostly of particles of dead skin and manure, which fall into the pail from the body of the cow during milking. Dust in the stable, dirt and dust in the vessels with which the milk comes in contact, and unclean attendants, are also common sources of dirt and impurities in milk.

After milking, everything depends on treating the fresh milk in such a way that it may undergo the least possible change before it is used or manufactured. For this purpose, care should be taken to provide the conditions most favourable for its keeping.

The milk-can must be placed in a special place at sufficient distance from the barns, to ensure of no contamination by the bacteria in an impure atmosphere, and the milk should be carried thence from each individual cow as soon as milked, and run through a fine strainer and over a cooling aerator. The lower the temperature to which it is cooled, and kept at, and the quicker it is accomplished, the better. It should be cooled to at least 50o F., and any temperature between this and freezing point will suffice. Every farmer must *have a dairy thermometer (floating), if* he would know what he is doing with his milk. It is a mistake to let milk freeze in winter, as the fat does not separate so readily and thus occasions considerable loss. Milk, treated as above, could certainly be kept sweet in such conditions for a week or perhaps even two weeks, the only noticeable deterioration taking place would be a lack of flavor the longer it is kept. This reason should be an incentive to farmers to supply and carry milk to their creamery daily throughout the year, as it is not to be expected that such perfect butter can be made from milk two days old as from that only 24 hours since being milked, and we cannot afford to establish a reputation for summer goods only. This is a question of vital importance at the present time, and it could be proved advantageous to the farmer in numerous ways, if they could so arrange the time for their cows to calve, that a daily supply of fresh milk may be always available, for the uniform manufacture of a fresh and well flavoured product.

Great care must be exercised to prevent milk from any unhealthy cow being taken to the creamery. Milk from newly calved cows is rarely fit for use or manufacture before the 7th or 8th milking, and frequently not as soon as that, whilst that from cows a few weeks from calving time is especially objectionable.

The above must be considered imperative, and especially appropriate are the above remarks to the months of April and May, when the majority of the cows calve nowadays. It is during these months also that the hot morning sun sometimes catches the milk out of the water, and, with the loss of a couple of milkings or so, teaches the farmer to keep his milk in cold running water. *If it would only teach him to keep it* in the whole year round, it would do him still more good. Every farmer should have two milk cans, one for the night's milk to be set in water over night the other to strain and aerate the morning's milk into before taking them to the factory, and thus the warm milk need never be mixed with the cold. The carrying cans, milk pails, strainer, aerator etc., should receive daily a most thorough cleansing and must be discarded or retinned as soon as the iron begins to get uncovered. A separate can, tank, or trough, should be provided to receive the skim-milk immediately it is brought home. The best way to clean cans, etc., is to rinse first in lukewarm water, then wash with soda and hot water, then rinse with clean cold water, or better still, sterilize in boiling water.

* * * * * * * * *

During April and May is generally a trying time to the butter-maker. With the quality and consistency of the milk constantly changing, on account of newly calved cows, and the temperature of the atmosphere changeable in

the extreme, it calls forth all latent skill and watchfulness to produce a first class and uniform article; and also must it be remembered, that the products of these two months may perhaps have to lie in storage for several weeks, prior to being consigned to a market.

This fact alone should cause much extra care to produce an article, dry, free from decomposing agents, in short with best keeping qualities; and, with this end in view, low temperatures must be the order of the day, which is facilitated at this time of the year by the increasing quantity of new milk.

In brief, be sure and refuse all bad and tainted milk, cool quickly and thoroughly after separating, ripen at 58o, churn at from 54o to 56o, wash twice with pure water, salt lightly, work thoroughly dry, but never overwork, and pack in good parchment-lined 56 lbs boxes.

H. WESTON PARRY,
Butter-maker,
Compton Model Farm.
Compton, P. Q.

THE BURLINGTON DAIRY-SCHOOL

Pasteurising apparatus—Refrigerating—Flavour objectionable—Table of heats, time &c. - Dairy-course—Lectures—Separators—Laval Machines—Butter by no means first-class—Alkaline-test—Over-ripening cream—Butter-workers—The herd—Working Oxen—Devons—Silage-smell in unventilated cow-house—Piggery.

Compton, Que., Jan., 30th 1897.

To the Hon. Louis Beaubien,
Commissioner of Agriculture.
Quebec.

DEAR SIR:—

In compliance with your wishes, I beg to submit to you the following report of my trip to Burlington.

Arriving in Burlington at 1 o'clock, on Monday, afternoon (18th inst.) I was driven to the Dairy School, which is situated about a mile and a half from the centre of the town, and presented myself with your letter of introduction to Prof. Hills.

He very kindly invited me to attend the lectures, and offered me every available opportunity to investigate and use the pasteurization apparatus and to become proficient in manipulating it.

The only pasteurizing apparatus in the school, consisted in a 50 gallon-vat, used solely for bottling milk, and of no special value in the creamery.

The vat used is a long narrow, deep, tin reservoir, surrounded by a wooden covering, making a 6 inch. water chamber on all sides, except on the top, which is covered by a tin cover overlapping on the edges of the milk reservoir. The milk or cream is heated by the surrounding water jacket that encloses the inner reservoir; the outer chamber being connected with steam and cold water pipes. The milk chamber is provided with a stirrer, that may be moved back and forth, either by hand or by being geared to a crank power.

After the milk has been pasteurized (usually at 155o F. for twenty to thirty minutes), it may be cooled in the same chamber. The milk to be bottled is then drawn from this into sterilized glass bottles (The "Common Sense" bottle), by means of a sterile siphon, and capped with paper covers that have been sterilized in paraffin for several minutes.

In all of these transfers, the greatest care is taken to prevent dust and dirt from gaining access to the pasteurized fluid. A separate room for this work is advisable. The pasteurized product must be stored in a refrigerator for several hours, preferably fifteen to twenty, before it is taken out for distribution. In this way, it is thoroughly chilled, and the full benefit of the process gained in the sudden cooling to a point below the germinating temperature of the spore-bearing bacteria that remain in the milk.

All bottles, cans, dippers, cloths, etc., that are used in the process are thoroughly sterilized in a steam sterilizer before using. For this purpose, a galvanized iron box is used, into which steam is introduced, and the larger cans are inverted over a row of small steam jets, thus gaining the full benefit of the steam when it is of the most value as a sterilising agent.

Ice or snow should be used in the latter part of the cooling process, in order to hasten the fall of the temperature of the milk when it approaches that of the cold water.

The length of time that the milk remains between the upper and lower germinating limits of the bacteria in the milk, should be diminished with all possible speed.

We found the pasteurized milk to possess a decidedly marked and peculiar flavour, and the resident buttermaker informed us that the same flavour had always been noticeable after pasteurization.

PASTEURIZING			COOLING	
TIME	Temperature of Milk	Temperature of water	Time	Temperature of Milk
1.12 P M	82°	91°	1.52	155°
1.17	106°	110°	1.57	150°
1.22	122°	132°	2.02	134°
1.27	141°	162°	2.07	82°
1.32	155°	160°	2.12	68°
1.37	154°		2.17	58°
1.42	155°	Water run off.	2.22	55°
1.43	156°		2.25	52°
1.45	155°		Water at 48° only.	
1.49	157°			
1.52	155°			

PASTEURIZING			COOLING	
TIME	Temperature of Milk	Temperature of water	Time	Temperature of Milk
1.15	80°	101°	1.54	155°
1.34	157°	162°	2.04	105°
1.39	155°	—	2.14	73°
1.44	155°		2.24	57°
1.49	155°	—	2.29	53°
1.01	84°	90°	1.49	150
1.06	102°	112°	1.49	130
1.11	122°	141°	1.49	100
1.16	152°	156°	1.54	74
1.19	155°	—	1.59	55
			2.01	52
			Snow used	

I am of the opinion that any foreign flavours in milk will be only the more fastened in and secured by pasteurization, and my experience at Burlington would tend to bear this out, as both Mr. Leclair and myself detected a strange flavour in the cream and butter at the Dairy School, which very much resembled that retained in the pasteurized milk, only less developed.

The following observations I made during three manipulations of the apparatus, skim-milk being the material used.

The dairy course extended from January 7th to February 3rd, there were about forty-five students in attendance. Two lectures were delivered daily besides a "quiz" on some chosen dairy subject, there was but one lecture on pasteurization scheduled and that was omitted as the lecturer failed to keep his appointment; however, I attended lectures on the following subjects, Dairy Stations, hog raising, the engine, separating, churning, testing, the care of milk, the dairy herd.

Three separators, or rather three different makes of separators, were operated, which gave the students an excellent opportunity to judge of their respective merits. These machines were placed in position and operated under the supervision of the agent representing that particular separator firm, and a fair and impartial test was accorded each machine. The machines were taken out at the end of the course.

I witnessed the following work done by the largest size "De Laval" separator. In the course of separating, three samples were taken of one minute duration each, i. e., whilst the speed of the machine was being timed for one minute, all the skim-milk and cream was caught in separate pails and weighed and the skim-milk tested, this was done at three different times, with the following results:

	Skim-milk lbs	Cream lbs	Speed
A.	38	8.8=46.8 lbs	5,800 rev
B.	37.8	9.2=47 "	6,000 "
C.	38.8	8.6=47.4 "	6,400 "

From the above will be seen that timing-sample "A" the separator was running under speed and the milk ran through an average of 2,808 lbs, per hour, or 200 lbs over guaranteed capacity. Skim-milk from this sample tested 1-10 of 1 p. c., in timing sample "B", separator still running under speed, milk passing at rate of 2,820 lbs. per hour, skim-milk tested 1-15 of 1 p. c., and in timing-sample "C", separator running correct speed, milk passing 2,544 lbs per hour, skim-milk tested 1-25 of 1 p. c. The guaranteed capacity is 2,600 lbs per hour, and the above must be considered a very good showing.

I was also greatly struck with the "Babcock Testers," being much more substantial and therefore more reliable, than that in our creamery.

The butter turned out did not come up to my standard of excellence but this may be accounted for by the more or less experimenting nature of the treatment of the cream.

The acidity of the cream was tested by means of the Farrington alkaline tablet test.

This may be used for two purposes.

1st.—For testing the acidity of milk. To detect those messes which are apparently sweet, but too nearly sour for pasteurizing for retailing, or for making the best butter or cheese.

2nd.—For testing the acidity of each lot of cream during its ripening to trace the progress of its souring, and to show whether the fermentation should be hastened or checked in order to have the cream in a certain acid condition at a given time and ready for churning.

In addition to the tablets, the only apparatus necessary for testing the acidity of either milk or cream is a common white tea cup, a 4, 6 or 8 oz. bottle, and a No. 10 brass cartridge-shell or similar measure. The testing solution is prepared by dissolving one tablet in one ounce of water. This is the standard. Four ounces of the tablet solution are made by filling a four-ounce bottle with water and adding to it four tablets. The No. 10 shell is filled with the milk or cream to be tested. This measured quantity is poured into the white cup. The same measure is then filled with the tablet solution and this is poured into the cup. The two liquids are thoroughly mixed and the color of the mixture is noted. If there is no change of color, another measure of tablet solution is added. This is continued until the sample which is being tested becomes a pink color. No standard color has been established, which seems to be essential. As soon as the pink color is obtained, no more tablet solution is added. The percent of acid in the sample tested is found from the number of measures of tablet solution it is necessary to add to one measure of the sample in order to produce the pink color. Each measure of tablet solution represents one tenth of one per cent of acid.

Milk does not smell or taste sour until it contains from three to four tenths of one per cent of acid. It has been found, however, that milk containing over two-tenths per cent. of acid cannot be safely pasteurized, because such milk sours very soon. These tablets supply a quick means of selecting the sweetest of different lots of sweet milk, by showing which contain less than two-tenths of one per cent of acid.

Cream is often ripened so far that the quality of the butter is injured. The usual method of the butter-maker for testing the sourness of the cream, is by the sense of smell and taste. It seems, a tablet test will show exactly what per cent of acid each lot of cream contains, so that the butter-maker is better able to judge how his cream is souring, and is better able to manufacture a uniform grade of butter, by always ripening his cream to the same point before it is churned.

Sweet cream contains about 0.15 p. c. of acid. Cream has reached the proper point for churning when it contains about six-tenths per cent of acid. As the souring of cream is largely influenced by the temperature at which it is held, the butter-maker is able to know, from an acid test of the cream, whether it should be warmed or cooled in order to have it ready for churning at a given time and just sour enough for making butter of good flavour. It is my intention to adopt these tablets for general use in our creamery.

Two butter-workers were in use, a "Mason" and a "Fargo", both power-machines, the "Mason" was considered to have most advantages, doing probably the best work. The butter was washed twice and worked but once. Local trade required ¾ oz. to the pound, and the Boston market 1 oz.

I was shown through the cow stable, and was delighted with the nice herd of high grade Jerseys. But, two years ago, tuberculosis broke out in the Station herd, and all that were not slaughtered were killed. (1) The herd which I had the good fortune to see, were cows picked up here and there, some few pure bred unregistered, but for the most part, high grades. A magnificent Jersey bull, headed the herd, and a fine pair of working oxen

(1) Probably, the writer meant to say All that did not die were killed.—Ed.

(Devon grades) were exhibited as the best team on the farm, and capable of ploughing an acre and a half a day. (1)

Their individual records were placed in front of each cow, legible behind the cow and in the walk in front. This record consisted of, name of cow, when dropped, pedigree, lbs milk produced between calving, lbs. butter, and average per cent of fat. A composite sample was kept of each cow's milk and tested weekly, and a book account was kept, charging the individual cow with exactly what food it consumed, and what return in milk and butter she gave.

From this book is compiled annually a record of the entire herd, giving in tabulated form the number of lbs.of milk given, the average test, the number of lbs. butter, and the values of all these which, together with what profit the cow's calf netted, made up the total returns, whilst against the cow was charged value of the daily feed raised,and of the daily feed bought, in separate columns ; then followed the cost of making 100 lbs. of milk, and the cost of producing 1 lb. of butter.

We found the stable smelled strongly of ensilage, on account, no doubt, of lack of ventilation. The cows made but two meals a day, consisting of ensilage and meal entirely. Many different kinds of meal were fed, including flax, brewers' grains, oats, corn, linseed and bran, from eight to twelve lbs. at a feed, together with from fifteen to twenty-six pounds of ensilage. All the likely heifer calves were raised, but none fattened. The cows were turned out twice a day for water. A nice arrangement in front of cows admitted the refuse being swept out of the manger on to the feed walk, this refuse was fed to the bull and oxen. In the barn was a clock, a thermometer, and three pairs of scales, and every particle of feed was weighed out.

In the piggery, was a very good arrangement for feeding pigs separately, which allowed them to sleep and exercise together, but so arranged that eight pigs could be admitted from the general pen, by means of opening a gate with a rope, into as many little pens, which admitted of but one pig reaching a trough in each at once.

Respectfully yours,

H. WESTON PARRY.

A DAIRY OF HOLSTEINS.

Abbottsford, Febr. 9th 1897.

To the Hon. Commissioner of Agriculture.

Dear Sir :

I have received a circular requesting me to give a statement of my Dairy.

My Dairy consists of 12 Holsteins Friesian Cows. I do not pretend to make dairying a special business, but as an ordinary farmer, I try to keep the best I can for profit.

I will give you a statement for the year beginning from May 1st 1895 to May 1st 1896 as taken from the books of the Secretary Treasurer of our factory, at Abbottsford.

May.....	8,615	lbs. Milk
June..	9,001	"
July.....	9,088	"
August.....	7,241	"
September...	5,300	"
October.....	6,440	"
November....	6,688	"
December....	7,523	"
January...	10,092	"
February....	9,236	"
March....	7,987	"
April....	6,969	"
Total amount for the year.....	95,080	"

Average Butter-fat :—3.7.

RATIONS.—Winter, fed on corn fodder cured in the field and cut and fed dry, with ground peas and oats, 4 lbs. 3 times a day until 15th January when the corn fodder being done, they were fed on good straw with the same amount of grain until April 1st. The rest of the season they were fed on mixed hay with the same grain rations. While in pasture, were fed twice a day with grain, 3 lbs shorts twice a day.

I would further add with regard to dairying, that most or a great many farmers persist in saying that dairying does not pay at present prices and that it does not pay to feed grain. Now, I contend that it does pay and pay well, if rightly followed. Not only does the cow pay for the grain in milk, but she pays for it again in her manure. And, again, you will notice the benefit for ten years following. So I say she pays for it twice the first year and pays ten to fifteen per cent for the ten following years. Now, what can a man invest money in that pays better than that, as for straw and hay manures you can not see much benefit for more than one or two years. No one knows that better than I do, as I have tried both systems, with the result that I would sell every cow on the farm rather than milk them without a liberal grain feeding. Then, again, it is not altogether feeding, but a great deal depends on the way the cows are milked ; if they are allowed to dry off at six months, they will be six months cows, in spite of all you can do. On the other hand, if kept in milk for 10 months, they will surely follow that rule, if properly milked.

You will notice by my statement that my cows do not vary much during the year, which goes to prove that I follow them up pretty close. Although I think I could make them do much better if I tended them altogether myself.

With these remarks, which I leave you to make use of or not as you see fit,

I remain, Yours, etc.,

(Signed) G. ROACH.

(Note) While we highly approve of Mr. Roach's method of feeding his cows, particularly of not entirely depriving them of extra food while on pasture, we would strongly recommend him to grind up a few pounds of flaxseed with the pease and oats, say, 1 lb., of flaxseed to 7 lbs. of the other grain. Why not grow enough roots to enable the cows to get half a bushels or so a day of mangels or Belgian carrots ? Two acres would be sufficient for the 200 days of winter, even if the crop was not very good. Upwards of 300 lbs. of butter a cow is a rare thing here. Ed.

WHEY FOR REARING CALVES

Whey is more useful for food than is generally supposed. It consists of about 93 p. c. of water and 7 p. c. of solids. The solid matter consists of about 70 p. c. of the sugar of milk, 14 p. c. of albuminous compounds, containing about 3.75 per cent of nitrogen, 11 per cent of ash, and nearly 5 per cent of butter or pure fat.

But while the food constituents in whey are considerable, and may be turned to good account in feeding calves, they must be largely supplemented by other richer commodities in order to sufficiently nourish the young animal. Fat-forming matter must be added to compensate for its removal in the cream ; and the nitrogenous matter, phosphate of lime, magnesia, sulphur, soda, etc., taken away in the caseine must be replaced. These may be supplied by using linseed and oat-or barley meal.

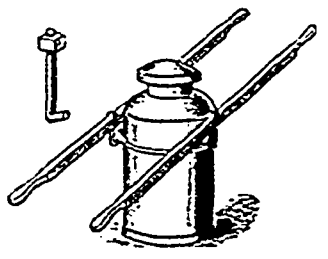
Whey should be used while fresh and sweet. If allowed to become sour, it would seriously derange the system of the calf, (though not of the pig.—Ed.)

It should not be fed alone, containing too much water and too little dry matter, but should be given with more concentrated food.

"Agricultural Gazette of New-South Wales."

EASY WAY TO CARRY MILK CANS.

James Magee, Grenville Co., Ont. :—"Take two pieces of good wood 5½ feet long, 2 inches thick, and 2½ inches wide ; bore a ⅜ inch hole through each in the center the wide way ; get two ⅜ x 5½ inch bolts, get your blacksmith to pound the heads level with rest of bolt, then turn an inch of the head end a little more than square from shank of bolt, as seen at A. Put one in each piece of wood. and you have a pair of handles for the two bolts and the labor



of turning the hooks. The ends of the handles should be dressed down to fit the hands. I have used a pair for three seasons, and find them very useful for carrying anything in a milk can. The advantage of these handles is that the persons carrying can use both hands at the same time. The hooks must turn to side of handles. Two men can carry twenty-five gallons of milk or water with ease." "Farmer's Advocate."

The Horse.

THE TROTTING BRED HARNESS HORSES.

(The following was unfortunately crowded out last month.)

What a "perfect horse" is—No use docking Conformation—Best height—Friction and action.

One of the best opinions given in connection with horses, and one that should be ever before the mind's eye of the breeder, is that of the man who said : "Perfection in a horse, means a well balanced combination of high rate speed, intelligence, beauty, stamina, style and finish." Of course to get a horse possessing all these virtues, one is in luck's way, but in support of this ideal it may be argued that, if the speed element, should not be sufficient to enable the horse to win on the track, there would still remain the other valuable qualities (that are generally lacking in the majority of what one may call, outclassed trotters), to commend him to the good graces of the buyers.

A breeder who can turn out good horses which will come under the heading of this paper, must most assuredly have had the proper material to start with, and few, but those interested, know the time, spent, expense incurred and disappointments experienced, before that material has at last provided the breeders ideal. Needless to say that, before this "consummation devoutly to be wished," many animals have been turned out without many of the attributes of the ideal "stepping" harness horse ; and many "know alls" prescribe docking "these, and so turn them into high steppers and carriage horses ; in fact urging that this is a capital way of getting rid of those horses without sufficient speed to pay their way on the race-track. To the thoughtful, nothing more hurtful to the interests of breeders at large could accrue from following such a policy. Let it be remembered that docking the tail of an undersized, light-boned, trotting-bred gelding, does not by any means make a carriage horse, and the offering of such a combined failure in both classes, would only result in destroying the slight footing the trotting-bred harness horse has gained.

If the supremacy of the trotting-bred harness horse is to be gained and maintained, in the show rings and markets of the world, the breeder of these must be careful, that the individuals he shows or offers for sale shall possess more qualifications than that of being a trotting bred horse, only sold as a carriage horse, because he cannot trot fast enough to win a race. Breeders should take this to heart, and give it careful consideration before, rather than after, the mischief is done. It is an axiom that the public likes to be humbugged, and in regard to horses this is not a very difficult operation, for what man is there that does not fancy he is a judge of a horse ; and we all know how dangerous is a little knowledge. Fake horses prove a boomerang to the whole business of breeding, and if breeders of trotters, desire to find a profitable market for them, in high stepper, and carriage horse rings, a type must be established. And this is what, the amateur breeder in Canada wants to learn, to breed—in any kind of horse breeding—to a type, and not go on year after year trusting to Providence and an easy conscience, as to qualities possessed by his foals. This slip-shod kind of breeding only does harm, giving as it does a bad name to the place in which it is practised. A little care in mating, even for the begetting of common yard farm horses will well repay the breeder, how much more then in breeding for sale ? A high stepper possessing conformation, style, size and all-round high action is as rare as a 2.06 trotter. Do not suppose for a moment that a horse that has marked knee and hock-action, that can step high and is lacking in all other qualifications, can last as a type, bring a good price in the auction ring, or take the ribbon in the show ring. The markets ruling the prevailing prices for horses, is very largely influenced by the decisions of the judges in the large shows. It is to be noticed that, in the States, the trotting bred high-tepper and carriage

horse is now more prominent among the prize-winners than ever before. But there are a great many other qualities possessed by these show winners than pace, which is the easiest of all the requirements for the trotting-bred horse to answer satisfactorily.

Conformation, substance, size, manners, and all round action, coupled, of course, with practical soundness, are the pricipal points judged.

Speaking of conformation, there is no doubt but that this general and indefinite term has undergone a general overhauling, since the introduction of the trotting-bred high stepper. Now, the requirements of not only the show ring, but also of the sale ring, are good clean cut head and neck, short back, round barrel, a nicely caried tail, well set on, good eye, and a well turned ear.

As the harness horse runs from 14.1 to 16.2 hands high, the term "substance" varies as to the animal's height. With the present fashion of docking the tail, good full quarters are essential. The durability or staying powers of the horse and this ability to pull weight, are largely governed by the shape of the barrel, and the existence of sufficient space therein to carry a good meal. Favourable points as to substance are a close ribbed barrel, short, strong coupling, solid, clean, sloping shoulders, with neck well defined for carrying the collar. The most difficult point to describe correctly, is the sort of all round action, which is acceptable to the show ring judge, and to the buyer. As a matter of fact a great many good judges differ radically upon this subject. My own opinion, after hearing this point thoroughly argued, is whether going fast or slow, that the horse which takes the least out of himself, or putting it in another way, shows the least friction, and acts just as nature intended without any grotesque exaggeration of action, is most entitled to the term good actor." Extravagant knee action, is certain to produce two or more evils. First, the hock action, unless the animal has string halt, is reduced, and a climbing effect in front, coupled with a squatting effect behind, is produced. Secondly, any horse with exaggerated knee action, if used on a paved street, and most of them are so used, must soon pound itself into a state of uselessness, despite all pads, and veterinary attention when off duty.

To those who think that all that is required for a trotting-bred horse, to become a high-stepper and roadster, is to cut off his tail, and send him to the sale ring, it is to be said, that the training and development of such a horse, requires as much patience, as much care, as much time, and as much knowledge of what is wanted at the end, as the training and making a trotting champion. The public, first of all, insists that what it buys for a good price, shall be a thoroughly broken horse, with sufficient substance to pull weight, with good manners, accustomed to city sights, fearless of trolleys, fire engines, steam rollers, bands of music, and things generally that would make a country-bred horse jump out of his skin. Last, and equally important with anything named above, he must be well bitted; and such horse, no matter what their ownership, will always bring good prices, and easily find eager buyers.

But, again, it must be said that any false steps taken, any careless, slovenly methods, any such practice as docking some old time "weeds", and throwing them on the market as trotting bred high steppers and harness horses, will prove a very unprofitable step to the owner, and will create a false impression of the family, and destroy, at a blow, the beginning of what might be a most valuable market for the trotting horse breeder.

W. R. GILBERT.

CLIPPING HORSES.

The London Live-Stock Journal has this:

We shall soon be in the middle of the clipping season. A highly-bred horse, with his short, fine, sleek hair carefully groomed, never looks so well as when he is left in his natural coat. But common hacks and ordinary roadsters improved in appearance by clipping. Their heavy coats are also an impediment to hard work, and are a source of discomfort to them when they return to the warm stable at night. They cannot be easily dried by grooming, and are apt to catch a chill, or at least they do not obtain such refreshing rest as they require before resuming their labors in the morning. In the treatment of such animals, clipping is to be commended. It is all very well to talk of not "interfering with nature" in such cases. We are deliberately interfering with nature at all points—by housing, grooming and working horses. The artificial conditions under which the horse exists in domesticity necessitate the adaptation of artificial treatment to render him in the highest degree useful as a servant of man.

MAKING THE HORSE SAFE.

Temper and maladies — Bad habits — Gentleness as a cure - Injudicious punishment—The master's voice.

Though, according to a writer, "the horse will always be a vain thing for safety," there is no necessity for his being oftentimes so utterly unreliable and occasionally really dangerous. It cannot be gainsaid, but that the true nature of the horse, is a docile one, and, in the majority of cases, where he belies his nature, he has good and sufficient reasons for so doing. Given the mildest tempered of men, afflicted with a bad attack of gout, is he recognizable? The weakest of Cristians suffering from tooth or earache, will often speak and act in a manner, not conducive to securing a seat among the elect. If human beings are so changed by pain, surrounded as they are by remedies for every ache, how can we wonder that an animal, unable to tell of his ailments, shows his resentment, and it certainly seems hard that he should then be dubbed "a perfect devil" etc, while the human being is commiserated, and pampered, and petted back into his right mind. So much on behalf of the natural good disposition of the animal; now, as regards his management.

Appreciating the fact that some horse natures are, like some human natures, totally depraved, and may be incurably so, there is no doubt but that, in the majority of cases, the fault is not with the horse, and even an unsafe animal may be made reliable and gentle if proper means are used in his training. Can we wonder at horses' tempers being soured, even supposing they escape all the natural ills that horse flesh is heir to, when we take into consideration the manner in which they are treated in their youth, before even they get into the trainer's or breaker's hands? How often is it that when placed in the breaker's hands, the young horse, instead of regarding the man with a species of curiosity, recognizes him, on sight, as an enemy?

Like all bad habits, this idea is hard to eradicate, making the trainer's work doubly hard.

But in this article, it is more my intention to treat of the management of the horse, when being driven, and the foregoing remarks are humble protests on behalf of—not excuses for—a worthy animal, proved so, too, in every phase of life.

Merely mentioning the necessity for gentleness and firmness in training, which all admit, but few practise either wisely or sufficiently, attention should be called to other points even more neglected. One of these for instance, is, that a horse should be made to approach and smell any object, which may have terrified him (I can hear a reader say "Oh bother we have'nt got time *for all that*") My answer is. "My reader has more money than sense, for putting up with this little bother, may be the means of saving may be, a valuable animal." In a case of the above kind, the usual way is to speak harshly to him, striking him at the same time with a whip. This treatment only serves to terrify the animal the more, since he has now too objects to fear. The thing in front, and the whip behind. Surely, any intelligent man will acknowledge that this is not a rational method. Neither is it successful, except that the horse may be compelled to dash blindly past the object of his fright, spoiled both in temper and nerve, and still ignorant that the thing which frightened him, was, after all, but a piece of paper. This is not necessarily to say that the whip is to be dispensed with altogether. It is indeed extremely useful when used merely as a reminder, tapping lightly, as a school master may at times use a cane, as a caution against doing anything ugly. Actual whipping, in the case of a frightened horse, is certainly wrong, unless perhaps when he tries to whirl or back. Then if circumstances are such, that he will regard the whipping as a punishment for that particular act, he may be flogged smartly. But punishment for backing or turning must never be mixed with punishment for simply being frightened. It is far better to spend an hour, getting a horse accustomed to something which has alarmed him, than by whipping him past it. A horse, becoming accustomed to the habit of investigation, will oftentimes turn off of his own accord to investigate a certain matter, knowing that he will not be allowed to pass, until it has been done.

To grind this habit of investigation into a horse successfully, however, as well as to be able to control the horse when frightened or excited, which is of more importance, requires him to have confidence in his driver—complete confidence, so that when the driver says "It's all right old man," the horse will believe him. Not that even the most carefully trained one, will at once, on that assurance, drop his head and forget the matter, though even this has been known. But he will feel that he has a friend beside, to help to watch the object, and who speaks quietly and soothingly to him. Just how far a few words will go in quieting fear, both in human beings, as well as in animals, no one knows, who has not tried it. The power of the human voice to soothe in fright is marvelous. We, personally, have seen it, some even have felt it, and yet how few have thoughtfully applied it to the horse. To be sure, there are but few who do not speak to him when alarmed, but in many cases the voice, or the manner of speaking, increases the fright.

To prevail with the horse, he must know who speaks, and whether dependence can be placed on the speaker; therefore, the voice, to avail much, must be a familiar one.

Aside from the advantage gained over the frightened horse, the extent to which he can go in understanding the words of his driver, is only limited by the pains which that person takes to *train him. So that, the habit of talking* to him increases his knowledge of words, to that extent that it is possible, in ordinary work, to get him to do many things by word, which the untrained horse will only do by the rein. Seemingly it increases or developes his intelligence, until he apprehends more clearly, as a result of what is practically an education.

This is not theory, unless it be proven *theory*. The writer knew of a horse, which was unreliable and unsafe, and the ideas embraced above are the ones, by the application of which the horse attained, almost the very acme of gentleness, provided he knew and trusted his driver. There was hardly anything in reason that that horse could not be talked past by his owner. Yet, when an unfamiliar voice did the talking, his conduct was always uncertain. For such a horse the above methods are alone likely to be successful. The principles here suggested, if applied from the beginning will prevent any ordinary horse from becoming unsafe.

W.R. GILBERT.

RELATIVE SIZE OF SIRE AND DAM IN BREEDING.

Danger of too much trust in others—General rule—Imported stallions — Ranche companies — Hunters — Giving the weight of horses useless —Suit the mare to the stallion — Thorough-breds.

The relative size of sire and dam, is a subject of some importance in the matter of breeding, whether by selection or crossing for the improvement of breeds of animals. "This," says Sanders, in his book on horse breeding, "is a subject upon which much has been written, and upon which I am satisfied there has been much wrong teachin."

It is true that nearly all writers upon the subject have laid down the rule that in coupling, the male should be smaller than the female; but it is also true that very many persons write dogmatically upon subjects which they know but little about, and it is further true that writers upon heredity, for years and years past, have done but little more than repeat each other, accepting what has been said by others as true without question, not knowing or caring to know anything about the facts in the case. I imbibed the doctrine that the male should be smaller than the female from my early reading upon the subject, and, began writing from the same standpoint; but very early in my career, a writer upon stock-breeding, my esteemed friend, Judge T. C. Jones, of Ohio, from whom I have taken many valuable lessons, called my attention to the manifest unsoundness of this theory, and said that he was fully convinced that the teaching of the books upon this subject was all wrong, and, that while he did not advocate great disparity in the size of parents, he was satisfied that, when there was a difference, it should be the reverse of what

the books taught and that the male should as a rule, be larger than the female. It was a startling proposition to me, but it set me to thinking and watching the subject closely; and now, looking back over more than a quarter of a century of experience, I say, emphatically, that nature's plan as exemplified in all mammalia is that the male parent shall be the larger of the two. "In all animals from the horse "down to the pig, wild as well as "tame, the male, as a rule, is larger "than the female of the same breed. "No observant man can have failed "to notice this. What pure breed or "race of animals, in any country, can "be named as an exception to this "rule?

"The best results have been obtain-"ed, in the case of imported draught "stallions brought to this country from "France and Great Britain, not from "large, course and loosely made mares, "as theorists would have us suppose "would be the case, but from those "of medium size, compactly made, "and highly bred."

I venture to submit the following criticism on the above, with respect to the breeding of high-class half bred horses, with the breeding of which I am more familiar than with that of any other class.

In the first place, we need not follow nature's plan at all, as the whole course of our procedure with respect to the horse, and the breeding of a certain equine strain to adapt it to certain desiderata, in the way of sport, or work, is an interference with nature from beginning to end. If we find that by following certain methods in breeding, by which we obtain a horse superior to the horse supplied by nature, that plan is the successful one for us to follow. Mayhew, an enthusiastic, but hopelessly unpractical writer on the horse, prescribes a regimen of food, for him, not only, economically impossible, but, which, if it were carried out, would never give us a horse, capable of doing the work he does now in his artificial state of domestication.

The promoters of ranche companies, when first started, gave us glowing accounts of the wonderful advantages of growing horse-flesh under conditions as nearly assimilated to nature as possible.

The truth of the matter has been abundantly proved by experience, that the ranche horse grown under the much vaunted conditions of limitless roving over a large extent of country, an unlimited supply of nutritious buffalo grass (and that alone, we might add), cannot hold a candle to the English or Irish hunter, who has been fed oats, from foalhood, whose dam has been carefully looked after, whose feet have been carefully pared every month, until shod, who has been handled since a weanling, and who has not been out of a loose box, except for exercise, since the age of three or four; for all those qualities of speed and stamina combined with docility and intelligence for which he is noted.

I think size is pretty equally devided, and that there are quite as many weedy gelding as mares. Horses may, as a rule, incline to be taller, to stand higher, but we must remember, that height is no more a criterium of size than it is of strength. A large-boned 15.2 mare, with a big girth, and powerful hind quarters, is a much bigger animal than a slab-sided 16.1 or 2 gelding. Almost always, when hunters are advertised for sale, in England or Ireland, the capacity to carry weight is given in addition to height, and, you will see, that, in weight carrying capacity, no horse follows the ratio of height. The Americans are very fond of giving the weight of a horse. This is as useless a thing, generally, as far as giving one any idea of weight carrying capacity, as the time test, is of the capacity of a race horse, as far as his speed is concerned, the weight of a horse, has not much to do with his weight carrying capacity, and I know of no more difficult task than to guess accurately at a horse's weight-carrying capacity, by mere inspection.

I do not think that there ever was in England or Ireland, any hard and fast rule, about the advisability of the stallion being smaller than the mare, only, in the case of a very fine-bred horse, put to a coarsish mare, he would probably be so. You must suit the stallion to the mare, and you may have to look over several before finding the right one; the difference in size, either way, is of very little importance, if all the other things are as they should be.

Medium sized horses as well as mares, are far preferable for breeding purposes in every respect, but, you will not always get large horses by breeding to small or medium sized mares.

There are a great many more well shaped small or medium sized horses than big ones, hence, I would always use a faultlessly shaped powerful small, or medium sized stallion, to any sized mare, than an inferior shaped larger stallion. It is so easy to lose quality, and so difficult to combine it with power. Hence the use of very well shaped smallish or medium sized stallions.

On the turf, it is notorious, in England at least, that, of latter days, large stallions and small mares, or vice versâ seldom breed anything as good as themselves; all matching of extremes is generally bad in result, and therefore should not be resorted to.

It is much more difficult to obtain true symmetry in over-sized than in moderately sized animals:

Very large mares are of all other the most likely to occasion disappointment. On some occasions they will produce foals equally large, or larger than themselves. In other years they will give birth to such as are under sized, and in most cases their stock is puny and weak

But, if you wish to breed large horses first and foremost, you will not get them by putting a big stallion to a small mare. You may get one, but you have as good a chance of getting a pony. By small, here, I mean a mare that is so in every respect of the meaning of the word, not a long, low, roomy mare on short legs.

If a brood mare, be under-sized, she should be put to a stallion somewhat, but not too greatly larger than herself, and the same system carried out with her offspring; so, in the course of two or three generations, we shall be most likely to attain the object of our desires, and increase the size without deterioration the quality. This is Wm. Day's opinion with respect to thoroughbreds but it applies equally to the breeding of any strain of high class half-breds. As to size, I may start by observing that the stallions which have been the most successful at the stud for many years are those of a middling size, or about 15 hands 1 inch to 15 hands 2 inches or 3 inches high. Other instances of success in moderately sized horses, we find in Touchstone, Orlando, Sir Hercules, Newminster and Hermit. These were most of them, comparatively speaking of small size. Again, Venison, when in training, was barely 15 hands, 1 inch, though he grew afterwards an inch or so; but he was still a pony by the side of such horses as Bay Middleton and Ellis. Both these comparative giants were better race horses and as well bred, and yet neither of them was successful at the stud. Galopin and Vedette, his father, were not bigger, neither were Kingston, King of Trumps, Defence, Sweetmeat, Macaroni, or Weatherbit; and, if we add Rilleman and Hampton, I think it will be plainly seen that little stallions, with mares suited to them, do get good stock and much better than most large horses get. A few failures of large horses may be enumerated in addition to those I have already mentioned. I place first on the list, Prince Charlie, perhaps the largest and certainly I think, the speediest horse of his day. This horse, now defunct, did not prove himself a great stallion; and though he was not without other defects, and serious ones, I attribute the failure in some measure to his immense size, Wild Dayrell, Plenipotentiary, and Brau, are three other instances of large horses who, whether in blood or performance, could scarcely be eclipsed, but who proved failure in their progeny. Indeed the only instance that I can call to mind within the last forty years of a thoroughly good stallion, above or about 16 hands high, was Stockwell. His brother Rataplan, and his half-brother King Tom, got many winners, but neither was anything like as good either at the stud, or on the Turf, as he himself was, while King Tom was the largest of the three, and perhaps was the worst in every respect. It should, however be remembered that Stockwell, though so high, was by no means a leggy horse, but one of the most powerful animals then in existence, or that I ever saw as a race-horse, standing on remarkably short legs."

As far as the results of my own experience in horse breeding goes, I will give the sizes of some colts and fillies bred by a thoroughbred stallion, barely 15.2, in height, out of mares of different sizes and heights.

Out of a 15.3 mare, one horse 16.1, one mare 15.1 and a quarter, one mare 15.2.

Out of a 15.3 mare, two horses, one 16.2, one 15.3.

Out of a mare 15.3½. One mare 16. one mare 15.2. one mare 15.2½.

Out of a mare 15.3. One mare 15.2½. one horse 16. one horse 16.2.

Out of a mare, 16.2. One horse 16.2.

It is to be noticed, that the mares are all smaller than the horses. even when out of the same mare. This would seem to indicate that if you want big mares you should use a large stallion. I am now putting medium sized, or small mares. to a big stallion, but the foals are yet too young to tell to what size they will grow. I should prefer to use, if attainable, a very well shaped powerful stallion, with quality, like Mr. Dawes, Glasgow, not over 15.3, to the same kind of mare not over 15.2., of the same stamp, in order to produce a high class hunter, which, if not quite up to the mark for hunter class, would at any rate fetch a very fair price, as a hack, or a carriage horse. Of course, as far as shoulder action is concerned, it is better that horses bred for hunters or hacks should not do any farm work at all, but if circumstances do not allow that, they can and will do cheerfully any kind of work on the farm, if judiciously broken to it. Of course, in this country, every horse must be broken to harness, even if never used after breaking, or he would not be saleable.

C. F. BOUTHILLIER.

The Flock.

HOW TO SLAUGHTER SHEEP.—Very few butchers here, especially in the country, know how to kill and dress sheep properly. The fine flavour of the mutton greatly depends upon the careful way in which the sheep is deprived of its blood, and its subsequent treatment.

In selecting a victim, the fattest of the flock should be quickly seized—the sudden rush and seizure by the hind-leg is the best way—taken into the slaughter-house, 24 hours before killing, and tied up to a post, by a halter, to fast and empty its belly.

A frame of laths, rather sunk in the middle, is a handy thing to lay the sheep on; three of the legs should be tied firmly together, leaving one of the hind legs loose, as the kicking of the sheep aids the rapid escape of the blood.

The "Country Gentleman" recommends chopping off the sheep's head with an axe! We prefer sticking a sharp knife through the jugular vein, and the breaking of the neck by a sudden jerk or twist of the head, all sensation then ceasing.

As soon as the final struggle is ended, hang up the sheep by the hind legs with a steel V shaped hook, and having stripped the skin off the quarters as far as the hock, make a slight incision in the skin on both sides of the leg and blow the carcase as full of air as you can manage, pressing and kneading the body all the time: this will prevent the meat from being bruised.

Now, get the skin off as quickly as possible; carefully open the belly, and having previously tied up the gut, and extracted the blader and the gall, wash the inside with copious drenchings of water. No fear of a sheep treated in this fashion yielding "woolly tasted mutton." This was the system observed in our early days when we used to superintend the "home-farm," whence never less than from 60 to 70 sheep were "sent to the house" every year.

With us, the cutting up of a carcase of mutton was simple enough: 2 legs, 2 shoulders, 2 necks, and a saddle, were all that was required. Not so foolish as to cut the saddle in half, to make 2 loins, thereby allowing the best of the gravy to escape before cooking. Try a double mutton chop, by cutting clean across the saddle, if you want to know what a good chop really is. The fat part of the neck is good, either roasted or boiled. Roast or boil the legs; roast the saddle; make mutton-chops both of the thin side of the neck; and roast the shoulder, with potatoes, previously par-boiled, under it, and onion sauce.

CHILVER.—Every Scot knows the meaning of the word "Hoggie," i. e. a young sheep, before its first fleece is shorn. Gloustershire people talk of "hoggets," Sussex, Hampshire, and Kent folk of "tegs," meaning young ones of both sexes, but in Gloustershire, the term "chilver" is sometimes applied to the female. Kent men speak of two-tooths, four-tooths, to designate shearlings and two-shear sheep. 'Chilver" refers to the age and sex, not to a species, as stated in the subjoined:

"There are a dozen words in the English language in every day use for which enterprising people have despaired of ever finding a rhyme. The word 'month,' for example, is one of these. 'Silver' is another word it seems easy

to secure a rhyme for. As a matter of fact, trying to find something to rhyme with 'silver' nearly drove a London writer of verse insane long ago. As a last resort he advertised in the newspapers and received but one reply. It came from that master of verbal contortion, W. S. Gilbert, Arthur Sullivan's erstwhile partner, who submitted the word "chilver." He wasn't quite clear, he said, as to what a chilver might be, but he had seen the word in advertisements of sales of farm stock, and had an idea, which is correct, that it described a species of sheep." Ex.

THE "BLOCK-TEST."—The following is an abbreviated form of the weights, etc., of some of the carcases of sheep slaughtered from the Smithfield Club-Show, Eng.

In the "wether lamb classes," Mr. Gosling's cross-breds, 300 days old, weighed, each, 145 lbs. live-weight, and 101 lbs. dead; all but 70 p. c., of carcase to live weight.

The Prince of Wales Southdown wethers, Champions of the whole show of sheep, 644 days old, weighed, each, 209 lbs. alive, carcase 141 lbs.; 67.46 p. c.; while Lord Rothschild's Hampshire-down lambs, r. for Champions, 307 days old, weighed, each, 210 lbs. alive, carcase 137 lbs.; 65.24 p. c.

The Prince's sheep had made a daily gain of 0.31 lb., whereas the Hampshires had gained 0.68 lb., daily, from birth. Though the Southdowns were 37 days more than twice as old as the Hampshires their carcases only exceeded the weight of the carcases of the Hampshires by 4 lbs., the daily gain of the Sussex wethers being a great deal less than half the daily gain of the Baron's lambs: i. e. as 31 to 68!

Mr. Russell Tress' "Border-Leicester" wethers showed the enormous yield of 73.86 p.c., of the four quarters to live-weight. In ordinary sheep, fit for market, the usual calculation used to be that a decently fat wether should yield a "Smithfield stone" (8 lbs.) of carcase for every "horseman's stone" (14 lbs.) of live-weight; in other words, 57 p. c.

The heaviest carcases were those of Lord Ellesmere's Suffolk wethers, aged 637 days: 227 lbs each—28½ Smithfield stones; the smallest were the carcases of Mr. Lawsons Cheviot lambs", which only weighed 60 lbs apiece.

VALUE OF SHEEP.—There seems to be, as might be expected, a vast difference in the value of sheep in England, as compared with their value in the States. By the computation of the U. S. Department of Agriculture, the sheep in that country, taking one with another, are only worth $1.83 cents a-piece equal to about 7s, 6d stg. Now, even at present low prices, and taking into consideration the poorest mountain sheep of Scotland and the West of Ireland, we shall not be far out if we value the lambs of the U. K. at an average of a pound a-head, and the ewes rams, and wethers at thirty shillings. So much for the difference of breeding for wool alone as in the case of the U. S., and for wool and mutton, as in the case of the U. K.

SHROPSHIRES.—A very useful breed of sheep, indeed, is the Shropshire; lots of wool, and very good mution. But what on earth does Mr. Mansel, one of the great breeders of Shropshires, mean by saying that "among the advantages possessed by the Shropshires is that they were not produced by crossing?"

Now, we remember very well, when Mr. Wood, of Mount Kisco, New-York, was having a sparring match with a breeder of Shropshires, in defence of his own flock of Hampshire-downs; we remember, we say, looking up our old authorities on this matter of the origin of the breed, and finding the following results of our research:

There was a great deal of difficulty in getting them acknowledged, by the R. A. Soc., as a distinct breed. At the Gloster meeting of that society, in 1853, whereat we were present, the prize list for this breed read: "Sheep.—Shropshires; or any other gray or black-faced short-wools; "Special prizes offered by the Hon. Robert Clive, M. P.," not, it will be observed, by the Society The first of these four prizes was won by a Hampshire-down, and the other three by Shropshires, and the observations made by the senior steward, Mr. Milward, were as follows: "The "new class" of Shropshire-downs was very successful; and it is to be hoped that the Society will recognise them as a distinct breed." A clear proof that as lately as 1853, they were "not" recognised as a distinct breed.

Thomas Ellman, the great Southdown breeder, of Glynde, Sussex, certainly sent rams from his flock to Mr. Whitmore, in 1835, and Prof. Colman, of the Royal Agricultural College at Cirencester, stated, at the Canterbury meeting of the R. A. Soc., that "In my opinion, fixity of type may be in time imparted to a breed of mixed origin by a careful rejection of unfavourable specimens. The Shropshire sheep is an instance of this, for, no doubt, some Southdown blood has been infused into the breed."

And great credit is due to those who, with indefatigable zeal, have succeeded in producing so very valuable a sheep as the Shropshire; valuable in every respect; for wool, thriving propensities, quality of mutton, and, not the least of its good qualities for this country, hardiness; and this from the original Shropshire breed, the "Morfe," which is described by a writer in 1785, as horned, black or speckled in face and legs, bearing a fleece of fine short wool, about 1¾ lb. in weight, the wethers of which breed weighed, at 3½ years old, about 12 lbs. the quarter." Will any unbiased breeder say that the modern Shropshire could have been evolved from such a stock without a cross?

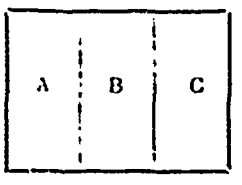
Agricultural Societies and Farmers' Clubs.

SAINTE FAMILLE CLUB.

PROGRAMME FOR 1897.

I. It is proposed to expend the balance of funds in the purchase of breeding stock or implements.

II. EFFECT OF WOOD-ASH AND SUPERPHOSPHATE ON MEADOWS:—On an "arpent" of land, divided into three plots, it is intended to apply to plots B and C, in the fall of 1896, 5



bushels (400 lbs) of unlixiviated wood-ash, and, in the spring of 1897, to add 150 lbs. of "Capelton" superphosphate, mixed with its own bulk of dry earth, on the plot marked C in the cut. Plot A is to receive no manure of any kind, but is to serve as a comparison.

PRIZES OFFERED BY THE CLUB FOR THIS COMPETITION.

1st prize...	$7.00
2nd "	4.00
3rd "	2.50
4th "	1.50
	$15.00

The plots B and C should be harrowed after the application of the superphosphate.

III. WELL MANAGED COW-HOUSES:—Five prizes:

1st prize...	$6.00
2nd "	5.00
3rd "	4.00
4th "	3.00
5th "	2.00
	$20.00

Only those who shall be given prizes who have most thoroughly demonstrated 1. the effect of wood-ash employed alone; 2. the effect of the addition of superphosphate on plot C.

Competitors must report to the Secretary-treasurer 1. the land selected; 2. the method of cultivation pursued; 3. the crop obained on each plot; 4. whether or not the extra yield on the two plots B and C is quite enough to pay for the money expended and the labour employed on them; 5. if they intend to continue the use of chemical manures.

Unless this report is sent in, no prize will be given to the neglectful competitors.

The competitors in the second case must endeavour to make as much manure as possible, and to devote great attention to the management of the mixen or dung-heap.

F. X. LETOURNEAU, Pres.
ED. BOILY, Sec.-treasurer.

ST. RAYMOND CLUB, PORTNEUF.

IMPROVEMENT OF MEADOWS.

REPORT OF M. PLAMONDON:—

1. Soil rather sandy with a little clay. (A sandy loam? Ed.) 12 years in meadow.
2. Wooden roller and iron harrow.
3. No draining needed. ("Egouttement"—water-furrowing meant here, probably.—Ed.)
4. 200 lbs. of plaster and 7 bushels of ash to the arpent.
5. The dressed arpent appeared to rather fall off the first week; but improved and eventually tripled the usual yield. The next arpent gave 75 bundles of middling hay, and the dressed arpent nearly 300 bundles of fairly good hay. (More than 2½ grass tons to the imperial acre; a very rare crop, even on the best farmed land in England. Ed.)

Certified before me,

E. O. PANET,
Justice of the Peace.

REPORT OF M. REMI CAYER:—

1. Soil sandy; 3 years in meadow.
2. Wooden roller; iron harrow.
3. No drainage needed.
4. Seven bushels of ashes, 100 lbs. of plaster to the arpent.
5. No effect for the first few days; after a fall of rain, the growth was so great that the non-dressed arpent only yielded 100 bundles of hay, of ordinary quality, while the dressed arpent gave 300 bundles of extra quality.

Certified before me,

H. PELLETIER, C. C. S,
for the district of Quebec.

REPORT OF THE JUDGES OF THE THE COMPETITION TO THE COMMISSIONER OF AGRICULTURE.

We, the undersigned, Judges of the Farmer's Club of St-Raymond, beg to report to you as follows:

In July, we visited the meadow of the competitors for the prizes offered by your department and by the St-Raymond Farmer's Club, and, after having taken copious notes on the spot, we assign the first prize (14 competitors) to M. Rémi Cayer, and the second to M. Ferdinand Plamondon.

The meadow of M. Rémi Cayer, the soil of which was a light sandy loam, received the following treatment: after harrowing, 7 bushels of ashes, and 200 lbs. of plaster were spread on an arpent. The yield of the dressed arpent was 300 bundles of hay of first-rate quality; the yield of the neighbouring arpent, undressed, was about 100 bundles of good quality.

M. Plamondon meadow was of the same soil as the above, and was treated in the same manner. The yield was about the same, but the quality not so fine. It is to be observed, too, that the hay of the non-dressed arpent was only middling, while the hay of the *corresponding arpent of M. Cayer* was good: the yield was at the rate of 3 to 1.

According to the reports of the majority of the competitors, the experiment has given the greatest satisfaction, both as regards the quantity and quality of *the hay grown on the dressed arpents.* On the whole, the increased yield was 100 per cent. The probability is that next spring will see a great increase in the number of arpents improved by the use of there manures.

On some meadows, owing it is supposed to the dry spring, the effect of the manures was not so great. (But, surely, the season was the same, as to the amount of moisture, all over the parish of St-Raymond!) Ed.

BOUCHERVILLE FARMER'S CLUB.

In 1896, were held competitions of maize for green-fodder, mangels, and green-meat crop.

The Secretary, M. T. A. Demers, M. D., says:

The judges of the competitions state that great improvements are visible in the farming of this parish. Formerly, hardly anything but hay was grown here, but now, dairying is in favour. A cheesery it at work, and is said to pay.

Being situated near Montreal, many farmers sell their milk to that town, and this is a very profitable business. Hence, the growth on a large scale of fodder-corn, mangels, carrots, and other green-crops.

SAINT-JUSTIN FARMER'S CLUB.

Dr J C Coulombe states in his report that excellent effects have arisen from the Farmer's Club here; the style of farming is much improved, the farms

are far better drained, (1) and a great deal of land has been levelled, this year, by means of the "horse-shovel." A ploughing match, held this fall, was attended by fifteen competitors, and will probably lead to great improvements. M. F. X. Gagnon grew 30 bushels of pease to the arpent on a furrow 11 inches deep, while an arpent contiguous, ploughed only 6 inches deep, gave barely 20 bushels. Autumn cleaning of stubbles is gaining ground in St-Justin; (2) the cowhouses are comfortable, and the stock decently fed. Almost every one grows green-fodder crops of some sort and roots. Fruit is becoming popular here, and several small orchards have been planted. Many of our farmers are thinking of settling in Temiscamingue next spring.

Our Farmers's Club receives "Le Journal d'Agriculture" regularly, and takes great pleasure in studying it; discussions ensue, and its members endeavour to follow the teachings of the Journal as much as possible.

ST. ANTONIN FARMER'S CLUB.

(Témiscouata.)

M. Pierre April, the Secretary, is very hopeful as regards the promise of improvements in the farm-work in this parish. Some roots were grown here last year, and the farmers seem pleased with the yield.

FARMER'S CLUB OF SAINT-SYLVESTRE (Lotbinière).

There are twice as many members as last year. The meetings are well attended by the farmers, many head of thoroughbred stock have been bought, and there is a good deal of emulation as to who shall sow the greatest quantity of good grass-seeds. The marvellous yield of the samples of seed-grain, from the Experiment-farm at Ottawa, excites much attention. If the Government continues the annual grant to the Club, it will, without doubt, end by revolutionising the entire farming practice of the parish.

J. A. VERRET, Ptre., Sec.
THOS. PAYEUR, Pres.

SAINT JEAN DESCHAILLONS (Lotbinière) FARMER'S CLUB.

There is a good deal of improvement visible in this parish, due, no doubt, to the exertion of the members of the Club. But it is sad to relate that too many farmers are still deaf to the voice of progress.

There are two cheeseries in this parish, the one held by M. Arthur Paris, the other by M. Victor Chandonnet; and two creameries, kept by MM. Hamel and Berrubé respectively.

In the village are a creamery and a cheesery; both held by M. Joseph Dubuc.

P. DROLET, prêtre, pres.
THOS. BERRUBE, Sec.

ST. BERNARD'S (Dorchester) FARMER'S CLUB.

Some improvement in farming visible here. The growing of roots, until lately ignored completely, has, since the starting of the Club increased every year. Cattle are better treated and better fed in winter.

The misfortune is, that the farmers will persist in keeping too many horses through the winter. Some of them will spend 25 or 30 dollars on the keep of a horse, that they do not in the least need; a horse that will not fetch 15 dollars in the spring. A total loss, it is clear.

A. DEMERS, Pres.
J. L. GENEST, Sec. Treas.

(1) Water-furrowed and ditched probably. Ed.

(2) A great gain, indeed! Ed.

ST. APOLLINAIRE FARMER'S CLUB (Lotbinière).

During the last year, the breed of pigs, the extension of the acreage of roots and fodder-crops, and the selection of grass and other seed have been greatly improved and increased. There is a visible increase in the sowings of timothy and clovers.

JOS. BOUCHER, Pres.
C. N. PAQUET, Ptre. Sec.

ST. MAXIME FARMER'S CLUB (Dorchester.)

This club is only one year old; so we cannot boast of any improvements in farming caused by its exertions in our parish. Still, we may say that our people take an interest in it, and that the "Journal d'Agriculture" is read and discussed in its meetings.

The members are highly pleased with the work of the horse-hoes (sarcleuses), and we trust this will lead to the extension of the acreage of hoed-crops in future.

PIERRE DE BACOURT, Pres.
SAUL TALBOT, Sec-Treas.

THE AGRICULTURAL CONVENTION AT WASHINGTON, A. C.

System of teaching—Too much variety — Implement tests — Acidity in soils—Milk.

BY PROF. FRANK T. SHUTT.

On November 6th, 7th and 9th the convention of the Association of Official Agricultural Chemists was held in Washington. It was very largely attended and is said to have been the most successful meeting in the history of the Society. Its membership is composed of the chemists of the United States Experiment Stations, and their object in thus meeting annually is to discuss and adopt analytical methods to be used in the examination of cattle foods, fertilizers, dairy products, soils, and all other matters relating to agriculture. The discussions are mainly technical and therefore of little interest to the general reader. The results obtained through the labors of this Association, however, are of the greatest importance to the farmer. They enable him to purchase fertilizers with economy and assist him in the rational feeding of stock, etc. Attendance at this convention impressed the writer with the fact that those who would keep pace with the onward march must avail themselves of that scientific knowledge that day by day is contributing to the solution of agricultural problems.

The officers elected for 1897 are as followed: President, Wm. Frear, Pennsylvania; Vice-President, A. L. Winton, Connecticut; Secretary, H. W. Wiley, U. S. Agricultural Department, Chief Division of Chemistry.

Immediately following the above, viz., on the 10th, 11th and 12th November, the Association of Agricultural Colleges and Experiment Station convened under the presidency of Prof. S. W. Johnson, Director of the Experiment Station, New Heaven, Conn. The attendance was very good, over 150 being present. The programmes of the various sections showed more than forty papers to be read, of which nineteen were on agriculture and chemistry. Many were so interesting that it is to be regretted that this review must be so limited.

In the inaugural address the venerable President referred to the promotion of agriculture by scientific investigation and experiment and by the education of those about to engage in agriculture for a livelihood. In both these channels, he said, America was doing a great and lasting, though perhaps not a brilliant, work. The character and technicalities of college work were then considered by the President, who, in closing, reviewed the chief features in the progress made during the past year by the Experiment Stations towards a better and clearer knowledge on the many different questions with which the farmer constantly finds himself confronted.

Dr. A. C. True, Director of the Office of Experiment Stations, submitted a report on methods of instruction in agricultural colleges in the United States and in Europe. A bewildering variety exists in the United States, and a reasonable uniformity is much needed, one great obstacle to which is a very defective nomenclature. He suggested a tentative scheme for simplifying the nomenclature of agricultural investigation, making five classifications: 1. Agronomy including climate, soils, fertilizers, crops or plant production; 2. Zootechny, or animal industry, animal physiology, animal production; 3. Agrotechny, agricultural technology, the dairy, sugar making, etc.; 4. Rural engineering; 5. Rural economy or farm management.

A most instructive address was given by Prof. Huston, of Indiana, on "Chemistry for Agricultural Students," in which he outlined a course of laboratory work that was at once didactic and practical in its character.

A spirited discussion followed a paper by E. Davenport, of Illinois, on "Implement Testing by Experiment Stations." Several held that this work should not be done, as the results were used as an advertisement by firms who obtained favorable reports. On the other hand, it was urged that reliable information on farm machinery was of the greatest value to the farmer; indeed, that it was just as useful and valuable as any other information given out by the Stations on fertilizers, cattle foods, treatment of land, etc. In this matter it is evident that no cast iron rule can be adhered to, but the discretion of the officer in charge of the work exercised.

Prof. J. H. Waters, of Missouri, presented a valuable price of research work on "Dynamometer Tests" of broad and narrow tires on different kinds and conditions of roads, and in fields plowed and in grass. The trials compared 6-inch and 1½-inch tires. Though there were some instances in which the lighter draft was obtained by the use of the narrow tire, as for instance where the mud was very deep and exceedingly sticky, this investigator showed that in the majority of cases, both in fields and roads, there was from 35 to 50 per cent. in favor of the broad tire. Apart from the disastrous effect on roads of heavy loads carried by narrow tires the data, presented proved the great economy in horse energy by adopting wide tires. This is a lesson that it is necessary for us in Canada to learn.

Dr. H. J. Wheeler, of Rhode Island, spoke on the acidity of certain soils in his State, and showed that this was due to their need for carbonate of lime. Good effects had followed the application of certain fertilizers, if accompanied by lime, though no increased yields resulted when the fertilizers were applied without it. Gypsum failed to give beneficial effects, showing that it was not a question of lack of lime, but also one of acidity, which prevented nitrification and injured plant growth. From the writer's experience in working on Canadian soils, he is led to the belief that we also have many upland, as well as lowland, soils which would be much benefited by a dresing of lime or marl—more particularly when accompanied by other forms of plant food.

"How to Sell Milk on the Basis of Quality" was the subject of a thesis by Prof. Georgeson, of Kansas, who favored rigid governmental supervision in order to ensure purity in the milk supply for domestic purposes. This was followed by papers on "Should Milk be Sold on the Basis of Quality?" by Dr. E. B. Voorhees, of New Jersey, and on "The Most Profitable Way of Disposing of Skim Milk," by President Hills, of Vermont. Prof. Voorhees made a strong plea for the sale of milk on the basis of quality, tests showing wide variation in nutritive values.

Dr. Salmon, Chief of the Bureau of Animal Industry, gave a valuable and interesting address on "The Effect of the Tuberculin Test upon the Dairy." He believed in the test; it was thoroughly reliable. He argued, however, against its frequent use on the same animal, as repeated injections appear to develop an immunity and no rise in temperature results though tuberculosis may be present. The test does not aggravate the disease nor effect the health of cattle free from tuberculosis. The subject was evidently one of interest to the audience, as the questions fairly rained in on the Doctor at the conclusion of his remarks.

Mention must be made of the paper by Dr. Whitney, Chief of the Division of Soils, on "A New Method for Ascertaining the Amount of Moisture in Soils" "*in situ*." (1) The speaker claimed that by the electric apparatus devised by him the percentage of water, at any depth, could be quickly and accurately ascertained. When we remember the important roll of soil moisture in crops growth the value of any invention that gives us further and reliable information on the subject will be apparent.

"Farmers' Advocate."

(1) "On the spot."—Ed.

Science.

ECONOMIC ORNITHOLOGY.

BIRDS IN THEIR RELATION TO THE FARM AND GARDEN.

(By J. F. Hausen).

In my last paper, we saw how useful the hawks and owls were to the farmer, and now I purpose to deal, in like manner, with the insecting eating birds properly so called a far larger

group, so far at least as they affect the garden, than the remaining kinds of birds.

THE BLACK-BILLED CUCKOO.

Of the cuckoos only one species is common, the yellow billed being an accidental visitant. The examination of sixteen stomachs of the other species, the black billed or rain-crow, yielded the remains of several spiders and grasshoppers and no less than 328 caterpillars—mostly of those hairy kinds that are gregarous and live on the apple and other trees.

THE DOWNY WOODPECKER.

This common species, which is a permanent resident throughout the year, is one of the most beneficial of this useful family. Although this little bird has often been accused of eating fruit, fully 75 p. c. of its food consists of insects. Out of 140 stomachs examined, apple was found in two and strawberries in one. One-fifth of its animal food consists of caterpillars, many of them stem-boring or leaf mining species, beside May-beetles, plant-lice and ants.

HAIRY-WOODPECKER.

Ranking is usefulness next to the preceding species, 65 p. c. of the hairy woodpeck's food is animal and mostly caterpillars, grass-hoppers, bugs, ants. etc. It eats no grain, and only wild fruits.

SAPSUCKER.

This common bird has the habit of boring holes in the bark of trees, and Mr. Wintle has observed it even breeding in holes in live oak and elm trees. As its name indicates, it sucks the sap that flows from the wound it has made. Although it may now and then kill an ornamental tree in this way, yet it does far more good than harm by destroying large numbers of insects that congregate at the flowing sap on our forest trees. An observer of the habits of the sapsucker writes to this effect: "As the sap exudes from the newly made punctures, thousands of flies, yellow-jackets and other insects congregate about the place, till the hum of their wings suggests a swarm of bees. If now the tree be watched, the woodpecker will now be seen to return and alight over the part of the girdle which he has most recently punctured. Here he remains with motionless body and feeds upon the choicest species from a host of insects within easy reach." It has been found by experiment that it cannot entirely subsist on sap, but that its diet is largely made up of insects. thirty-six per cent of its solid food consisting of ants which mine timber, infect houses and spread plant-lice. It is suggested to plant dogwood, wild cherry, etc., in order to keep it from ornamental trees.

RED-HEADED WOODPECKER.

This woodpecker has been blamed for attacking grain and fruit, but it also destroys large numbers of May beetles, weevils and especially grasshoppers. Whatever harm it may be found to do to cultivated fruits may be prevented by planting wild fruits of which it is very fond. For this purpose the following would be useful, Russian mulberry, elderberry, the wild cherries and dogwood.

THE FLICKER.

The golden winged woodpecker, like many another innocent bird, has been accused of eating corn, but we think unjustly, as only five out of two hundred and thirty stomachs contained traces of this cereal. Besides doing good in other ways, it feeds largely on ants, 3000 of which were found in one stomach. In speaking of the downy, the hairy and the golden winged woodpecker, Prof. Beal expresses himself as follows: "Not one of the trio shows a questionable trait, and they should be protected and encouraged in every possible way.

THE SWALLOWS.

The various species of swallows and swifts by their habit of being constantly on the wing are probably the greatest destroyers of insects we have in eastern North America. Moreover, they catch large members of ants during their periods of flight, weevils and aquatic beetles.

BARN SWALLOW.

Mr Judd says, "The barn swallow is the most noted destroyer of flies especially those kinds which torment stock

CLIFF SWALLOW.

As its name indicates the cave swallow builds under the eaves of our barns and houses, and, as it is so common, performs a most useful part in eating up hordes of mosquitoes, spotted squash beetles, winged ants, wheat midges and other injurious insects.

THE KINGBIRD.

After the examination of 218 stomachs the only possible conclusion reached is that this bird is one of the horticulturist's best allies in the destruction of noxious insects. Although frequently accused of eating the honey-bee, out of the whole number of stomachs previously mentioned only 14 contained the remains of the bee, and these mostly of drones. Insects were found to constitute 90 per cent. of its food. Among the insects it destroys are the gad-fly so annoying to horses and cattle, ants, grass-hoppers, the rosechafer and the cloverleaf weevil. It also rids the bee-keeper of that pest, the robber-fly, which has been known to kill 140 honey bees in a single day. The tyrant flycatcher attacks but few sorts of fruits, but from these its attention may be diverted by planting other wild kinds, as elderberries, wildgrapes, buckthorn, pokeberry, red and blackcherries, cornel, *mulberries etc.*

THE PHOEBE.

Its habits being mainly carnivorous, the peweet consumes numbers of injurious insects, such as the June bugs, caterpillars, leaf beetles, squash beetles and the weevils infesting peas, beans and wheat.

THE WOOD PEWEE.

Like the preceding species this bird lives to a great extent on two-winged flies, which is the group to which the common house-fly belongs.

SHORE LARKS.

Both the horned and shore lark do an immense amount of good in destroying much weed seed, such as sorrel, bitter-weed, amaranth and pigweed. The complaint against them that they consume newly planted oats and wheat is not borne out by the analysis of fifty-nine stomachs, showing that the loss they occasion to grain crops are only trifling. As they are thus exonerated from the charge of offsetting the good they do by any appreciable damage, they deseve to be protected.

THE BLUE JAY.

The charge of eating corn has been preferred against the blue jay, but during the period of the greatest abundance of corn in the autumn the stomachs examined showed only 1 per cent. of corn as compared with 61 per cent. of mast, consisting of acorns, beech nuts and hazel nuts. It is also reputed to be aggressive towards other birds, but out of 280 stomachs under examination, the remains of birds were found only in two, and birds' eggs in three cases. During the whole year corn made up 17 per cent. of its food, while 22 per cent. consisted of insects, thus inclining the balance in its favour.

THE CROW.

Much of the ill repute in which this permanent resident is commonly held is, no doubt, founded on prejudice and exaggeration. *Many of the accusations* against it dwindle considerably when the facts of the case are closely looked into. It is charged with pulling growing corn and injuring it while in the milk, stealing cultivated fruits, together with the destruction of the eggs and young of poultry and wild birds. The injury done to cultivated fruits is but insignificant and young corn constitutes only 3 per cent. of the whole food consumed. Although it must be admitted that it does some harm to the eggs and young poultry and wild birds, still this is but trivial, amounting to not more than 1 per cent. On the other hand, we must consider the incalculable good it does in ridding our growing crops of harmful animals and noxious insects, as it is a great foe of the grasshopper that notorious pest in all ages. In view of this the intelligent farmer ought rather to encourage it by providing food in times of scarcity, and so secure its services in destroying mice, cut worms and other small vermin

RED-WINGED BLACKBIRD.

Few people realize, when they hear a large concourse of these birds keeping up an incessant chorus of chattering in some swamp where they have gone to roost, what good the red-wings do in the neighbouring fields in keeping in check a most injurious group of beetles—the weevils.

Mr. Lawrence Bruner expresses himself as follows in respect to this bird, "In the red-winged blackbird we have a friend that we little dream of when we see the large flocks gathering about our corn-fields during late summer and early fall. During the balance of the year it is engaged most of the time in waging war upon various insect pests, including such forms as the grub worms cut-worms grasshoppers, army worm, beet caterpillar, etc. Even when it visits our cornfields it more than pays for the corn it eats, by the destruction of the worms that lurk under the husks of the large per cent. of the ears in every field.

Several years ago the beet fields in the vicinity of Grand Island were threatened with great injury by a certain caterpillar that had nearly defoliated all the beets growing in many of them. At about this time large flocks of this bird appeared, and after a week's sojourn the caterpillar plague had vanished."

Unfortunately this bird remains here only during the summer, but in the south during the winter it destroys the seeds of many noxious weeds, such as the ragweed, foxtail grass and bind-weed.

THE BALTIMORE ORIOLE.

The hang-bird with its bright plumage and graceful hanging nest is a favorite around our homes and has always borne a good character; out of 113 stomachs, corn formed only 1 per cent. of the total food. In one case it is reported as attacking grapes, but its accuser is careful to add that it is worth its weight in gold as an insect destroyer. Prof. Beal says, "The oriole is a most *potent factor in the destruction of caterpillars*, eating so many that if no other insects were taken it would still be classed as a useful bird. It does not, however, restrict its diet to caterpillars, but eats great numbers of injurious beetles *also many* bugs and grass hoppers, including beetles that feed on locust and apple trees, and the wire worm, one of the most destructive insects with which the farmers has to contend. In fact the oriole is one of the most useful birds that we have." Mr. Lawrence Bruner, speaking of the oriole, says: "As insect destroyers, both this bird and the orchard oriole have had an indisputed reputation for many years; and the kind of insects destroyed by both are of such a class as count in their favour."

MEADOW LARK

In regard to the meadow-lark, which has been blamed for eating clover seed, *Prof. Beal says, "Far from being injurious* it is one of the most useful allies to agriculture, standing almost without a peer as a destroyer of noxious insects." They wage war chiefly on grasshoppers and it was found that 99 *per cent. of the stomach contents* consisted of insects. A most painstaking examination to find out what percentage of its food consisted of clover seed, revealed the fact that it was erreneously accused, as only six out of 233 stomachs contained clover seed. I doubt whether this species occurs on the north side of the St. Lawrence east of Montreal, but if it could be encouraged our grass crops might be ravaged to a less extent than they were reported to be last season.

CROW BLACKBIRD.

This abundant summer resident may frequently he seen in the fields following the plough and eating up the numerous worms and grubs left exposed in the furrows. It consumes in addition many kinds of noxious insects, like May beetles, grasshopper, crickets, locusts, and the destructive curculios, or snout beetles, of which the plum curculio is a *familiar example. These pests, on* account of their small size and their habit of developing inside the fruit, are very difficult to cope with, because most methods for killing them cannot be employed without causing injury to the fruits they infest. In some exceptional cases where they have been reported to swoop down on cultivated fields in immense flocks, it cannot be denied that they may have done considerable injury. But, on the whole, I think it cannot be doubted that by destroying a vast quantity of insects they do incalculable good.

ROSE-BREASTED GROSBEAK.

As the rose-breasted grosbeak has an *especial predilection for the potato* beetle, it is deserving of the protection and encouragement of the farmers everywhere. Other species, like the cuckoo and the rail, also show the same fondness for this very troublesome pest.

CEDAR WAXWING.

The cedar bird, which is also known as the cherry bird, has gained a bad reputation as the destroyer of the cultivated cherry—an assumption which has very little foundation in fact when we consider that out of 152 stomachs carefully examined only 9 contained remnants of this fruit. Moreover, its young are largely fed with insects at a time when a great many fruits are at maturity. Worthless wild fruits form one-half and insects one-eighth of the food of the waxwing. Besides it eats grasshoppers, caterpillars, spiders, and the leaf beetles so injurious to our shade elm trees. One observer given to statistics estimates that thirty waxwings would consume nine thousand worms during the month when the cut-worm caterpillars are exposed. By allowing wild fruits to grow along fences and other out of the way places, much of the harm with which these birds are taxed might be prevented. The following varieties would prove useful for this purpose: choke and other wild cherries, dogwood, blackberry, June berry, hackberry, frost grape, barberry, haws, black elder, chokeberry, pokeberry, etc.

THE SHRIKE.

The food of the butcher bird during the summer months consists of insects, mainly grasshoppers. In the eighty-eight stomachs examined, ninety-eight per cent. was found to be insects. It also lives on mice, especially during the winter when insect food is scarce. Mice form eleven per cent. of the total amount of food for the year. It is thus evident that the butcher bird is far more beneficial than injurious.

THE VIREOS.

All our vireos are valuable because of their fondness for caterpillars, in the destruction of which they probably rank next to the cuckoos. From spring till autumn they may often be seen peeping in and out among the treetops of our forest and shade trees, constantly on the alert for out insect foes. They also eat many leaf-eating beetles, May beetles, weevils and inch worms.

THE CATBIRD.

As the food of the catbird is partly vegetable and partly carnivorous, it is not strange that there should exist considerable difference of opinion among fruit growers as to whether it ought to be classed as beneficial or injurious. An examination of the stomach contents, however, shows that more than one half of the fruits consumed are wild, while, on the other hand, one-third of its food consists of insects—many of them belonging to species which are highly injurious. In the case of a bird with such a mixed diet it becomes a problem how to secure its cooperation for good while guarding against its attacks on cultivated fruits. In conducting experiments with this object in view, Mr. Judd found that the catbird showed a marked preference for the mulberry and that it could be prevented from eating strawberries and cherries by planting the prolific Russian mulberry in unused places. "The testimony of 213 stomachs from points as far west as Kansas, as far south as Florida, and as far north as Massachusetts, collected from April to December, inclusive, shows that beetles and ants form the most important parts of the animal food of the catbird, though smooth caterpillars play no insignificant part. Crickets and grasshoppers are relished, and come next in importance. The less important though constant parts of the fare are thousand-legs, centipedes, spiders and bugs."

THE BROWN THRASHER.

Some fruit growers accuse the brown thrasher of committing depredations on the fruit crops, but it is not commonly held to be as injurious in this respect as the catbird, and it is also a shier bird. Its accusers blame it for attacking strawberries, raspberries, plums, pears, peaches, grapes and apples. But, while it may often be seen among fruit trees and may even eat fruit to a considerable extent, the fact that it destroys myriads of noxious insects must not likewise be left out of consideration. This is true especially after the berry season is over. "The economic relation of the brown thrasher to agriculture may be summed up as follows: Two-thirds of the bird's food is animal; the vegetable food is mostly fruit, but the quantity taken from cultivated crops is offset by three times that volume of insect pests."

On the whole, then, the brown trush in its present numbers is a useful bird, and it cannot but be regretted that a bird exhibiting such harmony of colouring and its sweet voice is so shy and distrustful of man.

THE HOUSE WREN

While not common in the vicinity of Montreal, at least so far as my own observation goes, the house wren is generally destributed, and is well known on account of its habit of building its nest in our gardens where it may constantly be seen waging war on our insect enemies. Whereas the thrasher and the catbird stop eating insects when fruits ripen, the wren keeps on at its good work throughout the season. In fifty two stomachs examined ninety-eight per cent. was found to be insects. The remaining two per cent. unaccounted for consisted of rubbish probably taken accidentally along with other food. Grasshoppers, both of the green and other species along with crickets form an important item of this bird's food. Caterpillars, bugs, spiders and other injurious kinds also play a large part in its diet. Our other species of this genus are also probably equally beneficial.

THE CHICKADEE.

The titmice are winter visitants and as such carry on the good work of destroying countless numbers of the eggs of insects at a season when other species of birds are absent. They do an incalculable amount of good in this way, more particularly in destroying eggs and the female moth of the canker-worm. Mr. E. H. Forbush of the Board of Agriculture of the State of Massachusetts estimates that one of these birds in a single day would eat 5,550 eggs, and in the twenty-five days during which the wingless canker-worm moth crawls up the trees 138,750 eggs. The same observer, after trying the experiment of attracting chickadees to one orchard during the winter, found that the trees were infested to a far less extent than the foliage in neighbouring orchards, where no efforts had been made to encourage this bird.

THE ROBIN.

The red-breasted thrush is a general favourite, although frequently accused of pilfering our fruit crops, but the harm it does on this way is probably overestimated. Of its total food only five per cent. consists of products grown by man. One-half of its food is animal, consisting of spiders, ants, bugs, wasps, and in large part grasshoppers, crickets and caterpillars. By planting wild berry bearing bushes, it might be prevented in large measure from attacking cultivated varieties of fruits. Mr. Lawrence Bruner, in comparing the relative amounts of benefit and injury done by the bird, says, "He is a poor business man who pays $10 for that which we knows must later be sold for 15 cents or even less. Yet I have known of instances where a robin that had saved from ten to fifteen bushels of apples that were worth a dollar per bushel, by clearing the tree from canker-worms in the spring, was shot when he simply pecked one of the apples that he had saved for the grateful or the ungrateful fruit grower."

THE BLUEBIRD.

This bird seems to have no accusers. It is largely carnivorous, more than three-fourths of its food being animal; twenty-five per cent. consisted of grasshoppers and crickets, and one-tenth caterpillars. As the bluebird seems to be such a desirable ally in the orchard, it might readily be attracted by planting the different wild fruits for which it exhibits a fondness. Some of these are the choke cherry, huckleberry, Virginia creeper, juniper-berry, bitter sweet, pokeberry, partridge berry, bird cherry, bush cranberry, dogwood, wild sarsaparilla, etc.

THE EUROPEAN HOUSE SPARROW.

The English sparrow affords a good instance of the harm which may be done by the thoughtless introduction of an undesirable animal into another country. But it is stranger still when we consider that it was under the ban in Europe even before it was brought over to America. There is no doubt that it does considerable damage indirectly in driving away more desirable native species which far surpass it as destroyers of noxious insects. The examination of 522 stomachs shows that, while it eats various cereals, it has no great appetite for insects. The general opinion seems to be in favour of its extermination, but in carrying out any measures to this end against it, care ought to be taken to employ assistants with a certain amount of training in order to avoid the needless sacrifice of useful birds. The neglect of proper care in this particular has more than once interfered with the favourable results that were expected to follow the placing of a bounty for its destruction. Besides its pugnacious habits, which render it so difficile à vivre, its boldness in nesting often causes it to mar the appearance of the walls of buildings by its dirty habits. In Australia it is reported to have caused such serious injury that the sparrow question played quite an important part as a "plank" in party politics. In regard to its driving away other birds, some observers assert that our native birds are becoming accustomed to this pest.

CONCLUDING REMARKS.

To sum up the question of the economic relation of birds to agriculture, I think that the only possible conclusion to be drawn from what precedes—so far at least as the detailed examination by trained observers of the species mentioned is concerned—is that, on the whole, they act beneficially in destroying weeds which plague the farmer, and in eating insects help to keep in check organisms the undue increase of which disturbs the balance of nature and threatens our welfare. The benefit to be derived from most birds having been shown, it becomes desirable to state in what way birds which do good are to be allured, and harmful kinds driven away. Injurious birds may be frightened away from cultivated lands by various devices such as scarecrows, pieces of dangling rope, or scraps of glittering tin hung on poles in the fields. The use of roughly stuffed cats, hawks and owls is also recommended. White twine stretched across berry beds will effectively prevent their depredations.

On the other hand, the attention of birds may be diverted from cultivated fruit by planting wild kinds for which they show a fondness. In doing this care should be taken to select those species of wild plants which ripen their seed at the same time as the fruit it is desired to protect. To protect strawberries and cherries during May and June, plant Russian mulberry and Juneberry or shad bush. The following plants will be a protection to raspberries and blackberries in July and August: mulberry, buckthorn, elder and choke berry. In September and October choke cherries, elder, wild black cherry and Virginia will lure birds from the apples, peaches and grapes. To protect winter fruits, plant dogwood, viburnum, pokeberry, bittersweet, mountain ash, Virginia creeper, hackberry and bayberry. All these may be planted along roads and fences and between grain fields. In conclusion, I may be permitted to quote the following passage from Mr. Lawrence Bruner's "Notes on Nebraska Birds," "If we take pains to water our birds during the dry season, they will be much less apt to seek their supply from the juices of fruits that are so temptingly near at hand. Place little pans of water in the orchard and vineyard where the birds can visit them, without fear of being seized by the house cat or knocked over from a missile from the alert "small boy", and I am sure that the injury to fruit to a great extent at least will cease."

PATENT REPORT

Below will be found the only complete up to date record of Patents granted to Canadian Inventors, which is specially prepared for this paper by MM. Marion and Marion, Solicitors of Patents and Experts, Head Office: Temple building, from whom all information may be readily obtained.

54,802—Thomas Boxall, Woodstock, Ont. Hymn indicator.

54,808—Joseph C. Pelletier, Windsor, Ont.—Berry Boxes.

54,813—Félix L. Descarie, Montreal, P. Q.—Hose pipe connection.

54,819—Fanny Clunn, Toronto, Ont.—Tent poles.

54,825—Fred. Cluff, Mar. Ont.—Saw guides.

54,829—*Charles E. Pickrell, Castlemore*, Ont.—Tire up-setting attachments to anvil-block and anvil.

54,832—George W. Delahey, Pembroke, Ont.—Shirt neck bands.

54,836—Frederick W. Shipman, Toronto, Ont.—Theatres.

54,840—Carl. Rubel, Township of Louth, Ont.—Art or process of making lime, and preparing and filling a lime-kiln.

54,842—*George H. Meakins, and Charles* W. Meakins, Hamilton Ont.—Cinder Sifter.

54,843—Peter Fraser, Hamilton Ont.—Device for heating and lighting apartment.

54,845—A. B. Jardine, Hespeler Ont.—Tables and pillars for drilling or boring machines.

54,850—A. Joyce and Wm. Fairbairn, Calobogie, Ont.—Closure for cans.

54,851—O. Feher and F. X. G. Charland, Montreal—Ice creeper.

54,897—T. R. Woodward and A. J. Esnouf, Richmond.—Cloth measuring machine.

57,778—V. A. Dmond, Québec.—Lubricator.

"BREAD FROM STONES." (1)

Bold announcements—Odd title—Marvellous effects—Diatribe against manures—Nitrogen useless—Nitrate of soda injurious Lime—Nitrate of soda, ph. acid, and potash are foods not stimulants--Carbonate of ammonia—Conclusion.

Under this somewhat captivating title there comes to hand a little book which purports to set forth a "new and rational system of land fertilization and physical regeneration." The work is a translation from the German, the author being one Julius Hensel, residing in Silesia. The latter half of this publication consists of papers, contributed by Dr. Hensel and others to German periodicals and Agricultural Societies. These essays are devoted to the praise and explanation of the merits—real or supposed—of this "Stone-meal Manure."

By reason of the oddity of its title, its foreign authorship and its cheapness, this work is receiving a somewhat wide circulation; by reason of its substratum of truth, the apparently scientific treatment of its subject and the plausibility of its arguments, the acceptation of its statements by many readers may be expected. It is on this account that I have been led to offer the following brief criticism.

In the preface, the author makes some bold announcements. In five short classes he states what fertilizing with "Stone dust" will accomplish. "1. Turn stones into bread and make barren regions fruitful. "2. Feed the hungry." "3. Cause healthy cereals and provender to be harvested, and thus prevent epidemics among men and diseases among animals."

"4. Make agricultural again profitable, and save great sums of money which are now expended either for fertilizers that in part are injurious and in part useless."

"5. Turn the unemployed to country life by revealing the inexhaustible nutritive forces which, hitherto unrecognized, are stored up in the rocks, the air and the water."

Dr. Hensel, it will be seen, here assumes the role of scientist, theorist, prophet and philanthropist. It is the same throughout the book; on every page, almost, we find an inextricable mixture of truth and error, of theory and imagination, that requires very careful sifting, if we are not to be misled thereby.

The argument, if such it may be called, of the work appears to divide itself into, first, a diatribe against the use of chemical fertilizers (such as nitrate of soda and superphosphate) and barnyard manure, claiming that they are wasteful, indeed, injurious; and, secondly, a eulogy in the form of various papers that have appeared in the German press on the merits of "stone-meal," apparently pulverized granite, gneiss or porphyry.

The author points out that the lands of the Old World cannot now compete with those of the New World, and states, as a reason for the decreasing yields of the former, that false methods of fertilization have been followed. While he admits that successive cropping reduces the amount of available plant food in the soil, he contends that the application of chemical fertilizers is treating the exhausted soils with medicine, and that this plan of restoring fertility is defective and unnatural and results in "unhealthy produce." Chili saltpetre or nitrate of soda is described as poisonous to plants and animals. Stable manure is only valuable for its earthy constituents, is another assertion. Indeed, the contention of the writer throughout is, that the supplying of nitrogen in any form is not only unnecessary, but, as a rule, is injurious to the quality of the crop harvested. While it is true, he says, "that plants assimilate such nitrogen as their roots find in the soil, that is by no means necessary." He maintains that all our agricultural crops and trees have the ability to assimilate the free nitrogen of the air, and this assertion is made on the strength of the fact that leaves contain more nitrogen than roots and stems!

Another statement in the pages of this little book is that "Lime and magnesia can replace potash and soda in the structure of plants."

Regarding nitrogen, Dr. Hensel is more concise in his statements than when speaking on the other elements of plant food. He says, "(1) that nitrogen in the form of carbonate of ammonia is directly injurious to the growth of plants; (2) that nitrogen is "unnecessary" as a fertilizer for the growth of plants if the soil contains a sufficiently of fixed basic substances alkalies and alkaline earth: (3) that the nitrogen of the solid and liquid manure may be used in the construction of plants, but in order to produce crops useful to health it is necessary to add to it a sufficient quantity of alkalies and of alkaline earths in the form of stone meal as a counterpoise."

Before criticising these remarkable assertions—and those I have quoted by no means exhaust the number our author makes—I will endeavour to place before the readers of the Journal the claims of Dr. Hensel for his panacea of all agricultural depression and the failure of crops—Stone-meal.

Very rightly, in speaking of the origin of the soils, he says that they have arisen from the disintegration of the primary rocks. While this is the truth, it is not all the truth. The soil's mineral constituents most certainly have had this source, but we have to face the fact that fertile soils the world over are rich in humus and nitrogen, the accumulated organic remains of successive years of vegetative growth. Our author entirely ignores the important part that these constituents play—a part which we know by the light of recent research to be an essential one in the production of lucrative yields. It will not be necessary to repeat the reasons for this, as we have already, in recent issues of the journal, discussed them at length.

Again, Dr. Hensel states that the production of crops leads to the diminution of many mineral elements besides potash and phosphoric acid. Quite true. The agricultural chemist recognizes the value of lime and advocates, under certain restrictions and conditions, its use; but, at the same time, he asserts that of all the stores of available mineral food in the soil, those of potash and phosphoric acid become first exhausted and must be replenished if fertility is to be maintained. Save under exceptional circumstances, there is such an abundant reserve of other mineral food, in the form of decomposed rock material, that the demands of our crops do not make it necessary to supplement them. It is the ignoring of these facts that leads our author to say, on page 39, "that the new earth from pulverized primitive rock, together with carbonate and sulphate of lime, forms the best and most natural fertilizer for an exhausted soil."

We may at once discuss the efficacy of "Stone-meal," this paragon of fertilizers. It is well known that plants take their food in one of two forms: in solution or gaseous. It is from the carbon dioxide of the atmosphere that plants by their leaves obtain carbon; it is by their roots that they take up, in dilute solution, mineral food and nitrates. In this latter statement we are excluding the legumes, which, as far as science knows, are the only agricultural crops that can assimilate the free nitrogen of the atmosphere. We are, therefore, brought face to face with the necessity of supplying nitrogen in inorganic combinations that can be converted into nitrates by certain organisms present in all arable soils.

Again, the mineral elements in pulverized rock must necessarily be in an extremely insoluble, and consequently unavailable, condition. Years of weathering must ensue before even small percentages become assimilable. The acid exudations of rootlets will no doubt play here an important part, but the solvent action of such is limited, as has been recently shown by Dr. Dyer, being only equivalent to a one per cent. solution of citric acid. Hence, this Stone-meal can only furnish mineral food but slowly; altogether too slowly to come within the limits of a practical and economical process.

We shall now examine our author's statements made at the outset. Properly applied, nitrate of soda, superphosphate and potash salts are "direct suppliers of plant" food, and, therefore, do not come under the head of stimulants and medicines. Their application cannot, therefore, be termed defective fertilization or unnatural. Further, as regards "unhealthy" produce. It is true that "excessive dressings" of nitrogen cause rank growth, and are injurious to the quality of tobacco, sugar-beets and some other crops. This fact, however, does not in any way dispose of the necessity of these plants for a soil supply of nitrogen; it only indicates that intelligence must be displayed in the application of fertilizers, that the peculiarities or predelictions of crops must be studied and the knowledge thus obtained put into practice. We recognize that the composition of plants may in a certain small degree be influenced by the nature and richness of the soil, but much of the talk about "unhealthy produce" being caused by the character of the fertilizer used is nonsense.

To say that barnyard manure is only valuable for its earthy constituents, is absurd. Its humus and nitrogen, as I have already stated, are essentials that have done, and still for many years will do, good service in the production of lucrative yields of perfectly wholesome food for man and beast.

We have already disposed of the argument that our cereals, root crops, and fruit trees are able to appropriate the nitrogen from the air; it is one for which Dr. Hensel can bring forward no proof that will bear the searching light of scientific investigation.

Though carbonate of ammonia, in quantity, is injurious to plants, it may be honestly and emphatically urged that it is never applied in this form. Such would be too volatile and unstable. It is certainly a transition stage in the fermentation of liquid manure; but accurate analyses have frequently shown that its presence in barnyard manure is only in infinitesimal quantities. It is really as organic compounds that the nitrogen exists in manure, a condition from which it is readily converted in the soils into nitrates—the only form in which the roots of crops can assimilate this element. No argument should now be necessary to prove the fallacy of the statement: "nitrogen is unnecessary as a fertilizer for crops other than legumes." If we know anything from science and practice it is that we must supply soil nitrogen. The "counterpoise" argument is in the main true, but admitting this does not strengthen the case of Dr. Hensel. The ration for plants, as for animals, must be balanced, if true economy is to be preserved. Nitrogen alone will not be sufficient, neither will the mineral elements per se afford all the requirements of crops.

Again and again it has been shown that the selective capacity of plants in the matter of their mineral nutrients is extremely limited, and there are ample data of the most accurate character on record to show that neither soda nor lime can replace potash in a plant's diet.

It will be as unnecessary as unprofitable to discuss here the chemical theories advanced by the author. For some of them there is a substratum of fact, but the deductions, for the most part, are really the outcome of a lively imagination, and we caution the reader from being led away by what appear to be plausible explanations, though in reality specious and fallacious deductions.

In conclusion, we do not deny that pulverized rock may contain mineral elements necessary for vegetative growth; but we do state that those elements are present in such an unavailable condition and in such small percentages that this material cannot be considered as a practical or economical fertilizer, and, lastly, we affirm that in humus and nitrogen, two indispensable of a fertile soil, this stone-meal is totally lacking.

FRANK T. SHUTT.

(1) Published by A. J. Tafel, Philadelphia, U. S., 25 cents net.

The Orchard and Garden.

COLD STORAGE FOR FRUIT

Outremont, P. Q., January 14th 1897.

G. A. Gigault, Esq.,

Assistant-Commissioner of Agriculture, Quebec.

DEAR SIR:—

In reply to your letter of 30th inst., I beg to state that the Cold Storage Warehouses referred to in my report are kept at a low temperature by the evaporation of liquid ammonia. There is nothing special in the construction of the buildings, only they must be frost proof. The temperature in the different chambers of a building can be regulated very much in the same way as in

heating by steam or hot water. It is considered that a temperature as near freezing point as possible is the most favorable for keeping apples. As machinery and steam power is involved in a cold storage warehouse of this kind, this means is seldom employed except where the quantity of fruit to be stored is very large, say 20 to 30,000 barrels. There are several of these warehouses in operation in Montreal and large quantities of apples are in store. The usual price charged is 25 cents per barrel. At a temperature of 32o Fahr., apples may be kept for months beyond their ordinary season, but when removed from this temperature, they decay very rapidly and cannot be transported any great distance.

With regard to keeping apples in cellars, I do not think there is any especial advantage in a cellar, only that we can construct a frost-proof apartment cheaper under ground than above. The chief points on keeping apples are, first, to have them in a temperature as near freezing as possible, second, to pick them carefully and before too ripe.

I enclose a circular of refrigerating machines, and shall be glad to give you any further information that you may require.

Yours truly,
(Signed) W. W. DUNLOP.

UTILISATION OF SURPLUS FRUIT

(Concluded.)

Chops—Disposal of product—Cider and vinegar—Early and late apples—Markets.

CHOPS.

These are prepared from the small and inferior apples, which are chopped or sliced without being pared or cored, the whole product being evaporated.

The demand is chiefly from Europe and the price obtained about one half that for good stock.

The process of manufacture as outlined may be applied to establishments of all capacities, the larger ones using steam power differing only in this respect that they are enabled to introduce many labor saving appliances for the handling of the fruit.

Judging from the greater number of the smaller evaporators in operation, this advantage must be at least compensated for to the farmer who evaporates the product of his own orchard, and thus receives any profit there may be in the operation; at the same time, providing occupation for the members of his household at a time when the demand in other directions is not pressing. The work of evaporating is usually done during the months of October, November and December.

As in other industries, there are many grades of products turned out of the evaporators depending to a great extent on the quality of the fruit used and the care and skill of the operator. Evaporated apples are classed in the markets as fancy, choice, prime, and poor to common. The percentage of fancy and choice made in Western New-York is very small, the greater part being classed as prime. The prime are again divided into two grades, wood-dried and wire-dried.

This distinction is created by a law passed by the German Government, prohibiting the importation of any dried apples, unless accompanied by a chemist's certificate certifying that the apples are free from any trace of zinc.

When Germany is buying quite freely, there frequently is a difference of one-fourth of a cent a pound between wood- and wire-dried fruit of the same grade. For the home market, the wire dried fruit is preferred, the traces of zinc owing to its contact with the galvanized wire trays being found, by analysis, to be too small to be in any way injurious.

DISPOSAL OF PRODUCT

The evaporators, as a rule, do not dispose of their products direct but to dealers who buy in large quantities and distribute to the home and foreign markets as required.

The principal consuming countries abroad are Germany, England, Belgium, Holland and France. In seasons when the grape crop is short in France, large quantities of chops, or waste, are used, chiefly for the production of cider, cheap wines, or for distillation. In Germany, the same products are largely used in the manufacture of jelly and of coloring materials. The jelly is flavored with essences and is not distinguishable from that made from the natural fruits. The strawberry, raspberry and other jellies, of which large quantities are used in New-York, are said to be, to a great extent, derived from the products of their own orchards exported to Germany in the form of chops and waste, and returned as choice strawberry and other jellies.

PACKING.

The better grades of evaporated apples are usually packed in boxes containing 50 lbs.; the bottom of the box is first removed, a layer of the fruit neatly arranged on a sheet of paper, the rings of fruit overlapping each other, and the box then filled and the bottom nailed on. Choice and fancy may be put up in smaller packages, and a paper box containing one pound is sometimes used.

Care must be taken in keeping this fruit during summer, and it has been found necessary to keep the white stock in cold storage, otherwise, it is liable to be discolored by the heat and its market value reduced.

The poorer grades, also chops and waste are packed in barrels.

From 200 to 275 lbs. may be packed in a barrel and for export it is usually required that a barrel shall not contain less than 250 lbs.

E. DUNLOP.

DISTRIBUTION OF FRUIT-TREES.

In order to encourage fruit-growing throughout the province, the Hon. the commissioner of Agriculture has ordered, from the nursery of M. Dupuis, of Aulnaies Village, L'Islet, 10,000 young root-grafted apple-stocks, which will be distributed, at the proper season, among the Farmer's Clubs.

Only those Clubs that have regularly made their report to the Department of Agriculture will be entitled to share in this distribution.

The directors of the Clubs may either give the trees to those who have been winners in the Competition of 1896; or divide them among their members as they see fit.

THE PLANTING of ROOT-GRAFTED FRUIT-STOCKS.

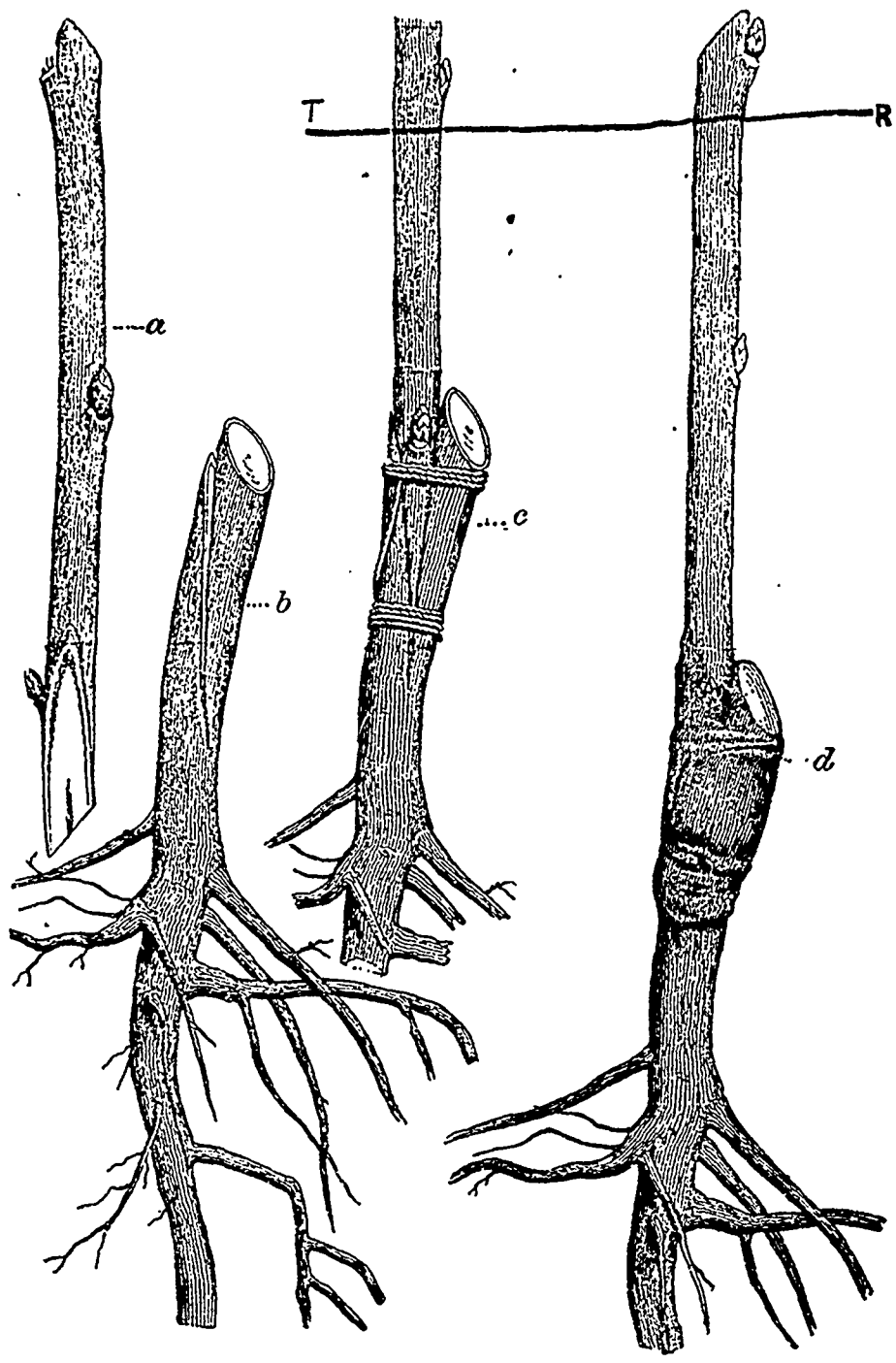
As soon as the land shall be dry enough, well manured, and has been warmed by the sun's rays, the trees may be set in rows, taking care to leave only one bud, on each graft, out of the ground (see engraving).

The lines should be about 2 feet apart, and marked out by a cord and small pegs, so as to perfectly straight.

(a) Wedge-graft; (b) stock with a place to receive the graft; (c) graft in position, bound firmly with waxed string; (d) the tie finished off with a covering of grafting-wax to exclude the air. The grafted stocks are to be completely sunk in the earth, up to the line T. R), only one bud being left out of the ground.

By means of a wooden dibber holes are to be made with one hand, six inches apart, and the grafted-stock set with the other; then, fine mould is to be arranged all along the roots, and pressed firmly down.

After planting, the land must be kept



GRAFTS.

clean by hoeing, and no shoots must be allowed to grow below the graft.

CULTIVATION OF THE GRAFTED PLANTS.

Those must be kept well earthed up, so that the union of the graft and the roots may remain covered with earth. The first and second year, a drenching, once a month, with weak soapsuds or liquid manure, will have a marvellous effect on the growth of the plants.

The first autumn, about October, spread, and tread down, a good coat of dung along the rows of the stocks: it should remain till the next fall, when another coat of dung should be added, to protect the plants during the winter.

It frequently happens that, after two years of this treatment, the plants are strong enough to be set out in the orchard; in doing this, the tap-roots, if any there be, should be removed.

The greatest care must be taken not to allow any shoots to grow below the insertion-point of the graft.

Household Matters,

SPRING.—The original sketch below, I think, fairly represents the name I have given it.

The dress is a very simple one, and would look well made up in any material suitable to the weather.

The skirt need not necessarily be of the same colour as the waist, the latter would look well made up in plaid, and as will be noticed, must fasten behind.

The finish is given to the whole by a ribbon or belt at the waist.

The hat is a very pretty and suitable one for this young person, and is easily made.

Bows of ribbon instead of the feathers will look well, and be less expensive.

The hat crowns do not seem to be of any use, they are so very small and quite hidden by the trimming.

The crown can be hard or soft; it

does not matter which, as the whole has to be fastened to the hair with pins.

I fail to see how they stand a windy day, but fashion decrees, and people submit.

LADIES' WAIST.—This is a most fashionable waist just now, but would take up too much space to explain how the whole is made. But it will serve as a guide in ordering a dress, as many dress maker could easily pick up the idea if shown the sketch and make one from it.

BECOMING HEADGEAR.—A woman ought always to consider whether a certain shape of hat or bonnet is becoming to her or not, before deciding to purchase. Unfortunately, there are many women who wear all sorts and shapes of hats simply because they are in vogue, not giving a moment's thought as to whether a particular kind of hat suits the face.

Let a woman's head-dress look faulty, and her whole appearance seems untidy, and perhaps shabby; but let the head be crowned with a pretty little hat or bonnet, which agrees with the features, and the appearance is altogether changed, notwithstanding the fact that the other garments worn are, perhaps, shabby. A becoming bonnet makes one forget all else, and if this little affair were attended to more than it is at present by many women, they would pass as fairly well-dressed, although the other garments may not be of the first class. What is more unsightly than to see a short, thick-set woman, with a plump, round face, wearing a large, flat hat and wide ribbons tied round her face? Doesn't it make you think of the old lady who wanted to dress up the full moon? At any rate, it suggests this idea before anything else, so whatever you do, don't let anyone have the idea, if your face should in anyway be inclined to be round.

On the other hand, a woman whose face is thin multiplies the thinness, as it were, if her bonnet be too small. In her case there must be a soft, full framing, and broad loops to tone down the angles.

A woman's neck often shows signs of age even before her face. When this happens to be the case let her remember the improving, softening effect of velvet bonnet strings. She might also well take advantage of the present fashion of wearing wide veils.—"Isobel."

OUR HOME.

COMPANY MANNERS.—If the people would only realize how very easy it is to teach children good manners when little, it seems to me they would never neglect to attend to it. The youngster is allowed to go his own way, to violate every rule of courtesey, sometimes of decency, until his habits are, to an extent, formed. Then, there is a great breaking up of established notions, and the child is punished and nagged and worried for doing that which it has heretofore been permitted to do without criticism. It becomes angered, sullen, unsettled and irritable, and if it has a strong sense of justice—which, by the way, is more common in children than people, as a rule, give them credit for—it feels outraged and abused, and becomes unmanagable and rebellious. The best school of manners for a child is the parent's example and home training.

Company manners are, by all odds, the worst element that ever entered into a family. Just why people should indulge themselves in all sorts of careless, indifferent and ill-bred habits when they are alone at home, and put on a veneer of courtesy, amiability and polish when somebody comes, is one of the many mysteries of this very mysterious thing we call life How much easier it would be to maintain the steady, uniform deportment, to follow out the same theories and hold to the same principles Sunday and week days, storm and shine, alone or in society

N. W. F.

TRUTHS.—Truths, of all others the most awful and interesting, are too often considered as so true that they lose all the power of truth, and lie bedridden in the dormitory of the soul, side by side with the most despised and exploded errors.—Coleridge.

HOUSEKEEPER.

Manures.

MANURING GRASS-LAND instead of ploughed land, was treated, at the Meeting of the Central Agricultural Association, in a most exhaustive manner by Mr. Ed. A. Barnard. He said this question might be divided into two distinct problems. First, when is it best to use farm manure as a top dressing to grass land? Second, when can such manure be made more profitable in the preparing of soil intended for future grass fields? That brought to their minds a third problem, namely, how can farmers secure the best and most economical grass crops for hay and pasture? The speaker then showed how carefully grass-land must be top-dressed in a climate so variable as ours, and mentioned the best ways and seasons at which barnyard manure should be applied in order to ensure good grass crops. Farmers were cautioned against being wasteful of any sources of fertility, especially those living at a distance from cities or towns, where natural fertilizers were not so easily procured. In the matter of using farmyard manure for soil intended for grass-land, rather than top-dressing existing grass-land, Mr. Barnard said they were on the horns of a dilemma, but remarked that if a forcible choice between the two has to be made it is better to use it on the soil intended for grass-land, as without it the chances of a crop of grass on such would be very slim indeed.

To this we might be permitted to add, that when the whole of the available manure of a farm is devoted to the hoed-crop; the first of all well-considered rotations, and when the rotation lasts, as is generally the case here, for at least 8 years, the interval between the dressings of dung is far too great to admit of the land doing its best for its owner. Say, for instance, we have 12 tons of dung to deal with. We should devote 8 tons to the root or hoed-crops, and 4 tons we should spread on the meadow in the fall, after the first crop of hay had been severed. Thus, in an 8 course rotation, the account would stand:

1st year roots and hoed crops dunged
2nd " grain with grass-seeds;
3rd " hay half-dunged
4th " hay
5th " hay
6th " pasture
7th " pasture
8th " pease, on light land, horse-beans on heavy.

And we wish we could see more horse-beans grown here. All they need is early—very early—sowing; drilling two feet apart, with 2½ bushels of seed to the acre, plenty of horse-hoeing and a touch of the hand hoe along the drills: a man can do an acre of this "edge-hoeing" in a day with ease. Mr Jas. Dickson, one of our most regular contributors, followed Mr. Barnard, and spoke on farming topics in general.

Then, Prof. Shutt addressed the meeting on "Clover as green-manure," humus, and nitrogen.

The Poultry-Yard.

At the meeting of the Central Agricultural Association, Prof. Gilbert of the Ottawa Experimental-farm gave some interesting details on the rearing of poultry, showing how the farmer could make profit out of fowls without neglecting the other branches of his business. Poultry manure was good for small fruit. Fowls were more frequently ill from over-feeding than any other cause, and required more grass and exercise. After answering several questions on the subject and proffering some excellent advice, Mr. Gilbert concluded his address.

COST OF KEEP.

Mr. A. G. Gilbert, our valued correspondent, gave, at the dusting of the "Farmer's Institute" at Lancaster, a very useful lecture on "Poultry." A hen should yield a yearly product worth from a dollar to a dollar and a-half. Cleanliness is indispensable. The morning meal in winter should be a mixture of boiled vegetables, household waste, with a little meal. Bones and chopped meat should be given two or three times a week. (May we be allowed to add that, as crushing raw bones is a difficult job, and as the mineral part of the bones is the part wanted, if the bones are burnt, in the stove or otherwise, they will be easily reduced to powder.—*Ed*). Cooked meat is preferable to raw. Scatter grain among the litter, to incite the hens to exercise themselves by scratching.

Correspondence.

Sherbrooke, March, 22nd. 1897.

Dear Jenner Fust.

Would it be wise for a man making 400 bushels of Brewers' grains a week to take a pasture farm and feed pigs, having the skimmed milk from 5 cows to help? He finds it hard to get more than 8 to 10 cents a bushel for his grains in winter, and cannot sell them in summer. Would clover pasture, grains, and corn meal make a judicious fattening ration for six months shotes and would he be making more than the cost of feed, wages etc., plus, enriching his farm? Grains I infer would hardly suit spring pigs during this first summer. Shorts, with clover pasture and a little grains, might do?

I am still much interested in your Editorials in the "Journal of Agriculture," and highly appreciate the fact of your having been the means of increasing the average of root-crops in this Province in a very marked manner.

I remain,

Yours very truly,

W. A. HALE.

We should keep both cows and pigs on a pasture farm. If we had such a supply of grains as our friend Mr. Hale speaks of. Pease with the clover, and a fair abundance of grains, added to a little corn-meal would answer well for both pigs and cows. To suit the present taste for lean pork, too much corn-meal must be avoided; but pease should not be omitted. More in our next. Ed.